1991 Annual Report

Massachusetts Division of Marine Fisheries

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Publication No. 17245 - 49- 250 - 12/92 -1.88 C.R.
Approved by: Philmore Anderson III, State Purchasing Agent

MASSACHUSETTS DIVISION OF MARINE FISHERIES ANNUAL REPORT

(Calendar Year 1991 and Fiscal Year 1992 where appropriate)

A letter to all constituents of the Massachusetts Division of Marine Fisheries from Philip G. Coates, Director

Dear Reader:

We have decided to resume production of an Annual Report after several years for a number of reasons, the most important being the need to enhance and supplement information about our activities and accomplishments on behalf of our constituents. Many of you already receive our quarterly newsletter ''DMF News'' which is designed to educate and inform our users and the public of marine resource research and management issues, and its companion piece, ''Regulatory Update'' which provides specific agendas of upcoming regulatory hearings as well as summaries of implemented regulations.

The Division has changed dramatically since our last report. The shellfish program, previously staffed by just two biologists whose major role was to provide advice to coastal towns and oversee the distribution of reimbursements to the cities and towns for shellfish management expenditures, has markedly increased in scope and responsibility. The Division is now responsible for classifying all shellfish growing areas according to new federal standards, monitoring for various shellfish toxins, and conducting periodic sanitary surveys to assess the health of shellfish beds.

Due to an infusion of money from the federal Sportfish Restoration Program - part of the Wallop/Breaux Fund - our recreational fisheries support program has increased significantly. In addition to fielding a team of biologists dedicated to addressing issues germane to the Commonwealth's marine recreational fishermen, we support the collection of accurate recreational fishing statistics, conduct research on important recreational species, and critically review most activities in coastal waters that might impact fisheries habitat.

Our new programs complement a solid array of existing programs designed to monitor, enhance and manage our coastal fisheries. For example, questions about data vital to the commercial and recreational fisheries are being answered by a new team of sea samplers; they will enhance the Division's and the Marine Fisheries Advisory Commission's ability to make rational management decisions.

New and expanded programs are not possible without a solid, reliable funding base. Thanks to members of the General Court and Governor Weld, dedicated funding has been reestablished in the Department. License revenues, a small portion of the gas tax generated by boating marine sportfishermen, federal grants and the Wallop/Breaux reimbursements, are combined to create a revenue base that should sustain the Division for the next few years.

(please turn page)

It is most appropriate that our infrastructure has been strengthened since we are going to need all we can muster to restore the important coastal fishery resources that are so much a part of our maritime heritage. Groundfish - the combination of various flounders and demersal white fish including cod, pollock and haddock - are under intense scrutiny by the New England Fishery Management Council. A draft management plan should be ready for public hearing shortly after this Annual Report is published.

The declines in many other coastal resources are also being addressed through management plans prepared and implemented through the Atlantic States Marine Fisheries Commission. Plans have been approved and are being written for summer flounder, weakfish, black sea bass, scup, shad and river herring among others.

Certainly, all resource news is not negative. Those of you that fish for striped bass are undoubtedly aware of the successful restoration effort for this magnificent fish. Striped bass restoration is being achieved by cooperative state management, backed up by relatively simple (by federal standards) but very effective federal legislation that assures that management decisions approved by the Atlantic States Marine Fisheries Commission will be implemented by all states who harvest the resource.

Cooperation between state and federal governments is rightfully described as the most appropriate way to manage other coastal interjurisdictional species. Although federal legislation didn't pass this year, a major priority in 1993 will be the passage of comprehensive (and hopefully simple) interjurisdictional fisheries legislation.

The reports that follow summarize Division activities and accomplishments during 1991. I urge any reader who wants additional information about any of our programs to contact me, any Assistant Director or our project leaders at our field facilities.

Sincerely,

MASSACHUSETTS MARINE FISHERIES ADVISORY COMMISSION

1991 ANNUAL REPORT
MASSACHUSETTS MARINE FISHERIES ADVISORY COMMISSION

The Massachusetts Marine Fisheries Advisory Commission is a board established by the Legislature in 1961. Nine unpaid members "qualified in the field of marine fisheries by training and experience" are appointed by the Governor for a period of three years. The Commission works with the Director on management of marine fisheries and holds public hearings on regulatory matters within the jurisdiction of the Division. Regulatory changes and public proposals are approved or disapproved by a majority vote at the Commission's monthly business meetings.

The Commission also works through subcommittees on issues that warrant intensive focus. For example, the Fisheries Management sub-committee drafted a 1992 plan to accomplish lobster license transfers.

During 1991 and through June 1992, the Commission held eight sets of public hearings regarding many fisheries management issues. The Commission has a quarterly hearing schedule with hearings in the months of February, May, August, and November. Hearings are held in at least two locations around the state to accommodate regional interests. Occasionally single issue hearings are held when the Commission determines the issue cannot be incorporated into the quarterly schedule.

In 1991 the Commission approved regulatory changes designed to manage and enhance the marine fishery resources, while promoting and developing recreational and commercial marine fisheries. These changes are summarized in the following section.

Licensing Changes

·License "control date" established for the issuance of commercial permits for fisheries not currently under limited entry or moratorium. The Commission may use this date to restrict future access to the use of some gear types including gillnets, and most forms of mobile gear.

Fishing Practices Regulations

·Coastal lobster permit holders who do not possess a fish pot permit are allowed to take sea bass and other finfish by pots as long as the weight of finfish does not exceed the weight of lobster [CMR 6.12(2)]

·Commercial fishermen were allowed to possess 25 lbs of processed (e.g. filleted) fish for their personal use, but not for sale, trade, or barter.

·Sea scallop fishery restricted to the use of 10 foot width dredge, and scallopers banned from fishing areas closed to mobile gear.

·Buffer zone created around fish weirs where no fishing is allowed without permission of the weir owner. Zone must be marked by 12" orange floats.

·Marking of fish pots and vessels required similar to marking of lobster equipment and lobster vessels.

·Sea bass pot limit reduced from 400 (or 600 with two permit holders on board) to 350 (and 550 with two permit holders).

·Scallopers defined as mobile gear users and the territorial seas line considered the outer boundary of the Commonwealth for

management purposes.

·Experimental fishery established for the taking of surf clams from contaminated areas for use and sale as bait.

·Ban on night-time mobile gear fishing in Nantucket and Vineyard Sounds from April 15 - October 31.

·Seasonal ban (April 1 - Nov. 15) on the use of gillnets south of Cape Cod amended to include surface nets and driftnets.

·Squid season established through the allowance of small mesh trawls shortened from April 15 - June 15 to April 23 - May 31.

·Minimum trawl mesh size for the summer trawl fishery in Vineyard and Nantucket Sound increased from 3 1/2" to 4 1/2".

·Trawlers using small mesh south of Cape Cod during April 23 - October 31 limited to 100 lbs of flounder(s).

·North of Cape Cod large-mesh area for trawlers extended along the backside of Cape Cod.

·Inner boundary of mobile gear area 5 (off Rockport) clarified.

Species-specific Regulations

·Striped bass commercial landings cap raised from 160,000 to 238,000 lbs.

·Atlantic sturgeon sale and possession banned.

·Blue claw crab minimum size of 4 1/8" across the carapace established along with a ban on the take and possession of egg-bearing females.

·Scup minimum size for commercial use increased from 7" to 9" total length.

·Quahog minimum size changed from two-inch diameter to one-inch thickness, allowing Massachusetts to conform with interstate market standards and minimum sizes in neighboring states.

·Conch minimum size of 2 3/4" (width) established at the request of commercial fishermen. To facilitate enforcement and to comply with Dept. of Public Health regulations, the on-board shucking of conchs was prohibited. Finally a closed season of Dec 15 - April 14 was adopted.

Regulations Adopted to Coincide with Interjurisdictional Plans

·Shrimp season established and trawl design specified.

·Weakfish minimum size of 12" established.

Miscellaneous Regulations

·Fishermen required to facilitate boarding officers for inspection of the vessel and/or catch.

·Labeling restrictions for aquaculture-raised hybrid striped bass established.

·Technical corrections accomplished: missing landmark in Boston harbor redefined ; scuba divers required to mark both the air tanks and floating marker with permit number; redundant gillnet closure repealed; V-notched lobster regulations repealed after statute repealed the prohibition.

·Minimum size of three shellfish (quahogs, soft-shell clams and oysters) established by regulation after authority was granted to DMF by legislation.

A number of proposals were rejected by the Commission after considering public hearing testimony. They included:

·A proposal from the Cape Cod Charter Boat Association to ban taking of Bluefin tuna by purse seine from state waters.

·A proposal from the Massachusetts Lobstermen's Assoc. to ban the landing and possession of lobsters taken by trawl.

·A proposal from a commercial diver to increase the minimum size of sea scallops for divers only.

Personnel Changes

In August 1991, Mark Amorello replaced outdoor writer Charles Soares on the Commission, and in May 1992 Russell Cleary, Executive Director of the Commercial Anglers Association was appointed to the Commission replacing Chairman Frank Mirarchi who ably served for 17 years on the Commission.

COMMISSIONERS

William Adler, Green Harbor
Mark Amorello, Pembroke
Russell E. Cleary, Arlington
"Rip" Cunningham, Boston
Frank Grice, Plympton
Clifford Jones, Rockport
"Kemp" Maples, Wellesley Hills
Anthony T. Tolentino, Boston
Anthony Verga, Gloucester

Fisheries Policy Management And Regulations Support

David E. Pierce,
Aq. Bio IV
Project Supervisor

The staff assists the Director and the Marine Fisheries Advisory Commission (MFAC) manage the Commonwealth's marine commercial and recreational fisheries in cooperation with the other states and the Fishery Management Councils. They assist in the initiation, evaluation, and selection of management strategies and implementation of rules and regulations. They gather and analyze biological data, communicate with the media and public regarding state management issues, create and maintain records of MFAC meetings and hearings, and ensure agency adherence to administrative regulation protocol and procedures. In addition they also handle most matters related to internal waters processing operations (involving foreign vessels) and state waters at-sea processing by U.S. vessels.

The project supervisor serves as the Director's designee at New England Fishery Management Council and committee meetings and is Massachusetts representative on some Atlantic States Marine Fisheries Commission (ASMFC) management boards. He provides management and scientific advice to the Director, MFAC, and the Fishery Councils.

The supervisor was:

(1) appointed Massachusetts representative on the ASMFC Summer Flounder Management Board working with the Mid-Atlantic Fishery Management Council to develop an amendment to the Council's Summer flounder Management Plan and to revise the Commission's 1982 plan -- a cooperative effort for improved interjurisdictional management. Also completed was a review of the Council's draft amendment and preparation/presentation of DMF comments at a Council public hearing; liaison work with DMF's representative to the Summer Flounder Scientific and Statistical Committee; acquiring and relaying Massachusetts fishing industry views on plan proposals; and voting to have the ASMFC adopt the same Council management strategies for state waters implementation in 1992/1993.

(2) was also appointed Massachusetts representative on the ASMFC Winter Flounder Management Board. Working closely with DMF's S&S Committee representatives, he provided DMF's perspective on the draft plan and voted at the ASMFC Board meeting to request that the Commission adopt the plan that each state would bring to public hearings in 1992.

(3) was made chairman of the ASMFC Sea Herring Board's Technical Advisory Committee (TAC) that prepared an assessment of sea herring abundance and developed recommendations for the Board regarding advice to the governors of states having industry requests for internal waters processing operations (transfer of herring by U.S. vessels to foreign processing vessels anchored in state internal waters). He also served as a member of the ASMFC's Sea Herring Plan Development Team which is developing a new sea herring management plan for the states in cooperation with the New England Fishery Management Council. Six days of meetings were devoted to the PDT. The TAC spent four days preparing updated and improved assessments and developing IWP advice for the Board. He prepared detailed reports of TAC conclusions and recommendations for the Board and presented the reports at two Board meetings.

(4) was appointed to the Council's Groundfish Plan Development Team (PDT) with the charge to develop by the end of 1992 a new Groundfish Plan which would significantly reduce fishing mortality and rebuild overfished groundfish

such as cod, haddock, and yellowtail flounder. A fishing effort reduction strategy serving as the basis for a major 1992 amendment to the existing Multispecies (a.k.a.. Groundfish) Plan was drawn up.

(5) chaired a DMF ad hoc Technical Advisory Committee which met twice and recommended the creation of a ''coastal access'' regulated fishery permit, new and revised net mesh size requirements and/or time periods, and an increased scup minimum size. The TAC also evaluated the merits of spawning closures for scup, sea bass, and squid, scup fishery exemptions to the mobile gear night closure, possession limits and a fluke recreational fishery fishing season, and a smaller maximum vessel size for fishing in Massachusetts waters. The TAC recommendations, detailed in a report to the Director and MFAC, were the basis for major DMF/MFAC regulatory changes in 1992.

Acting in his capacity as a DMF staffer responsible for assisting the initiation, evaluation, and selection of state waters management strategies and development/implementation of rules and regulations, the supervisor prepared technical memoranda and reports regarding: (1) the success of DMF's 3-year moratorium (1988-1990) on issuance of sea bass pot fishery permits and the 400 pot limit for that fishery; (2) better approaches for managing all pot fisheries (excluding lobster); (3) the merits of a night closure to mobile gear fishing in Nantucket and Vineyard Sounds; and (4) the pros and cons of a petition to ban the landing of lobsters by draggers.

A new sea sampling program staffed by two samplers under the direction of the assistant supervisor was created. This program evolved from DMF sea sampling exercises such as the November 1989 study of draggers fishing in Cape Cod and Massachusetts Bays; 1989-1992 sampling of the squid fishery in Nantucket and Vineyard Sounds; and 1990-1991 whiting fisheries in Cape Cod Bay and off Rockport. In addition to his administrative duties, such as keeping a record of MFAC meetings and scheduling public hearings, the assistant supervisor undertook many sea sampling trips. From May through November, 25% of his time was devoted to lobster sea sampling and attendant duties. He also sampled squid and whiting fisheries and produced reports for the Director and MFAC detailing his findings such as by-catch and discard of juvenile groundfish.

The staff, working with the Information Officer, made significant changes in the manner in which ''DMF NEWS'' was produced. By consolidating all public notices, previously mailed whenever necessary, a quarterly publication called ''Rules Update'' combining quarterly public hearing announcements, regulation changes, Commission decisions, and legislative updates was created. It is included in the newsletter and mailed to an expanded mailing list of over 6,000 individuals and organizations including DMF permit holders, other agencies, and any interested parties.

The staff testified during an evidentiary hearing in District Court brought about by a squid at-sea processor's challenge of the 90' vessel limit and DMF's selective issuance of at-sea squid processing permits for specific quantities of squid.

A report for DMF and MFAC describing at-sea processing applications for 1991 was produced. It included a prediction of squid abundance and prospects for the spring fishery, suggested methods for characterizing future spring fishing seasons, and suggested amounts and number of at-sea processing operations to approve for 1991. Recommendations as to which permits to approve and the types of conditions to attach to each permit were produced. A report describing the 1990 at-sea processing of squid along with details of catches observed on commercial vessels was written.

Another issue of significance related to the squid fishery was a buffer zone around fish weirs located along the south side of Cape Cod from Barnstable to Chatham. Working closely with weir fishermen, the staff helped DMF and MFAC deal with these fishermen's request for a buffer zone to prevent interference with the weirs by other commercial fishermen and by recreational fishermen -- both groups seen fishing alongside or even within weirs. Two reports on the issue were written and a regulation was drafted to implement the controversial concept seen by some as setting aside ocean bottom for exclusive use by one gear type and group of fishermen and seen by others as a reasonable way to avoid conflicts with large, immovable weirs permitted by towns with DMF approval.

A Gloucester fishermen's request for major changes to management of fisheries near Rockport was evaluated. This evaluation included a detailed description of the complicated history of regulations and laws affecting Gloucester fisheries in state waters, the consequences of adopting the fishermen's request, and recommendations for dealing with the fishermen's request. The regulations pertaining to mobile gear fishing in state waters from Gloucester to the New Hampshire border were rewritten and simplified.

The drafting and review of regulations was a frequent task throughout the year. The staff participated in DMF's Regulatory Review Committee comprised of DMF and Division of Environmental Law Enforcement staff. This Committee reviewed proposed regulations and suggested changes to the ''Code of Massachusetts Regulations'' (CMR) to correct mistakes and make improvements in existing regulations. A 22-page summary of

pertinent rules and regulations for specific fisheries was compiled. This document is an easy reference to the CMR.

The supervisor's other activities included: serving on the Northeast Fisheries Science Center's Stock Assessment Review Committee, as the ASMFC representative, for a week of reviews of fisheries stock assessments; serving as DMF's representative to the ASMFC Management and Science Committee at the annual ASMFC meeting; assisting the Director develop for Governor Weld's consideration a list of potential candidates for appointment to the New England Fishery Management Council; and handling most matters related to the review and approval of sea herring internal waters processing operations in Massachusetts internal waters.

The assistant's other activities included the permitting and monitoring of squid at-sea processing operations and sea herring internal waters processing operations.

Additional Personnel:
Daniel McKiernan, Aq. Bio. II
Assistant

Bureau of Administration and Operations

Budgetary, Staffing and Revenue Summary
Michael Henry, *Assistant Director*

BUDGET:

The DMF fiscal year 1991 and 1992 appropriations were as follows:

Account #	Name	FY 91	FY 92	Change
2330-0100	Marine Fisheries Administration	$1,986,352	$2,703,033	+36%
2330-0311	Sport fisheries Retained Revenue	800,000	800,000	0
2330-1001	Shellfish Plant Retained Revenue	110,400	0	-
TOTAL:		**$2,896,752**	**$3,503,033**	**+21%**

(NOTE: During FY 91 DMF's original appropriation in Account 2330-0100 was reduced by $520,000 due to mandated budget cuts).

STAFFING:

Authorized personnel levels were as follows:

2330-0100	65.5 FTE's	70 FTE's	+7%

(NOTE: During FY 91 DMF added four positions, then lost four other positions due to mandated layoffs.)

REVENUE:

License fees	$1,671,920	$1,723,159	+3%
Shellfish fees	180,743	199,650	+10%
TOTAL	**$1,852,663**	**$1,922,809**	**+4%**

Bureau of Commercial Fisheries

James Fair, Jr.
Assistant Director

Historically, projects organized under Commercial Fisheries have been those which support, define and assist in the regulation of the commercial fishing and seafood industry in Massachusetts.

A major reorganization in 1988 resulted in expansion of the two-person Shellfish Technical Assistance Project into a Shellfish Sanitation and Management Program with 20 employees and an emphasis on public health and environmental protection. The Shellfish Purification Plant is also included in this new program, which is expected to expand further into all aspects of shellfish management, biology and sanitation.

The Fisheries Technology Program, which has concentrated on marketing and extension projects since its inception has evolved away from those activities toward conservation engineering projects, including research on the selectivity of various types of fishing gear, the behavior of fish in response to the gear, and the survival rates of escapees and discards.

The Lobster Research Project completed its eleventh annual assessment of the lobster resource in state waters, based on extensive sea-sampling with cooperating coastal lobstermen, and provided general technical assistance to management entities and industry.

The Commercial Fisheries Statistics Project continued its long time series of reports on commercial effort and landings from selected Massachusetts fisheries. In addition, the project assisted other Division projects with data entry, database management and data analysis, and coordinated Department involvement in the EOEA ADP Network and Systems Modernization Project.

The Licensing Program issued a total of 24,173 Commercial Fisherman, Dealer and Special Permits, and collected $ 1,677,575 in fees. Licensing personnel also act as staff in the Boston Office, and are the first line of communication with the public.

In 1991 Massachusetts ranked fifth nationwide in pounds of fisheries products landed, and second nationwide, behind only Alaska, in terms of landed value. A total of 288,924,000 lbs.. of landings worth $295,838,000 was reported landed in our ports. New Bedford was once again the leading port in the nation in terms of landed value with $157.7 million in landings, while Gloucester ranked tenth with $40 million. Although landings of principal groundfish species continue to decline, the decline has been somewhat offset by higher prices.

Licensing Income and Statistics

CLASSIFICATION	TOTAL # 1991	TOTAL $ rec'd 1991
COMMERCIALS		
Coastal Lobster	1,681	437,060
Offshore Lobster	740	192,400
Boat 0-59 ft.	1,208	157,040
Boat 60-99 ft.	147	28,665
Student Lobster	54	3,510
Individual	583	37,895
Shellfish	1,229	49,160
Shell. & Rod/Reel	375	20,625
Rod & Reel	1257	43,995
TOTALS	**7,274**	**970,350**
DEALERS		
W/S DEALER	611	79,430
W/S TRUCK	168	21,840
W/S BROKER	23	2,990
RETAIL DEALER	755	49,075
RETAIL TRUCK	61	3,965
RETAIL BOAT	38	2,470
BAIT DEALER	107	6,955
TOTALS	**1,763**	**166,725**
SPECIALS		
NON-COMM. LOB.	12,123	484,920
REGULATED FISHERY	638	19,140
MASTER DIGGER	17	2,210
SUBORDINATE DIGGER	267	10,680
BAIT (cont.clams)	132	3,960
STRIPED BASS	1,741	17,410
''OTHER'' SPECIALS	218	2,180
TOTALS	**15,136**	**540,500**
FINAL TOTALS	**24,173**	**1,677,575**

There was an revenue increase of $11,320 over the 1990 revenues.

The following personnel work for Commercial Fisheries in Licensing in Boston:

Eileen Cox, Aq. Bio. I
Kevin Creighton, Aq. Bio I

Under Administration are:

Joan Short, Clerk III
John Simmons, Bookkeeper II
Darlene Pari, Receiving Teller
Eva Morales, Steno. II
Marguerite Proia, Typist II
Tina Mann, Laborer

At the Sandwich Office:

Marie Callahan, Clerk III
Kim Trotto, Stenographer II

Shellfish Program

J. Michael Hickey,
Aq. Bio. IV
Program Leader

The major emphasis of the shellfish program during 1991 was maintenance and refinement of the sanitary classification of the Commonwealth's shellfish growing waters under the provisions of the National Shellfish Sanitation Program. This activity requires sanitary surveys of growing areas, triannual reevaluations and annual maintenance of the surveys in each area. In the two years prior to 1991, sanitary surveys were conducted in over 100 areas throughout the state.

In the early part of 1991, most of the staff time was spent completing unfinished written sanitary survey reports on field work previously completed which covered some 37 areas. Additionally, 25 sanitary surveys (9 North Shore and 16 South Shore) were completed and another 11 were initiated (4 North Shore and 7 South Shore). Twelve triannual reevaluations of growing areas were completed and 3 were initiated. Nine wastewater treatment plant by-passes were also investigated.

As part of the above mentioned activities and the annual maintenance requirements, a total of 8,997 water samples and 404 shellfish samples were collected and analyzed for fecal coliform bacteria. The following is a break down by region:

North Shore: 1,705 Water samples, 375 Shellfish samples.

South Shore: 7,292 Water samples, 29 Shellfish samples.

This work was conducted in a total of 268 shellfish growing areas (69 North Shore and 199 South Shore) in 60 communities (19 North Shore and 41 South Shore).

As a result of this activity four previously closed shellfish areas, totalling 601 acres were re-opened to harvesting under conditional classifications based upon rainfall. Portions of Little River in Gloucester (86 acres), Bass River in Yarmouth and Dennis (175 acres) and Little Bay in Fairhaven (350 acres) were reclassified and conditionally approved allowing direct harvest during the approved status. Area BH-9, Upper Neck Cove, Fore River, Weymouth (82 acres) was reclassified as conditionally restricted as a result of a DMF sanitary survey and assistance from the Department of Environmental Protection (DEP) which analyzed shellfish and sediment samples for eight metals because of the area's proximity to a known fertilizer plant and dump site. This area is now open to commercial harvest of softshell clams for depuration.

Two catastrophic storm events had a sizable, albeit mostly short term impact, on the sanitary status of shellfish areas nearly statewide. On August 19, 1991, Hurricane Bob caused flooding and serious damage to coastal property and boats especially along south coastal areas. As a result, extensive closures were made totalling 500,000 acres on the south side of Cape Cod and in Buzzards Bay and another 33,294 acres on the North Shore. This was followed by an all-out effort to assess the impact of the storm on the sanitary quality of the shellfish beds and comprehensive water sampling in each area. Most areas were re-opened to pre-hurricane status by September 5, 1991 except for 2,500 acres in Buzzards Bay, (Fairhaven and Mattapoisett) which remained closed until November 27, 1991.

The Halloween gale of October 30 - 31 also caused extensive coastal flooding and damage resulting in 600,000 acres being closed along the South Shore, Cape Cod Bay, and Nantucket while 339,294 were again closed on the North Shore. All areas returned to pre-storm status by late November except for the area from Duxbury to Hull (40,000 acres) which still remained closed at years end due to extensive damage to homes, septic systems, and sewer lines.

During 1991, 420 shellfish samples were collected by project staff and analyzed for Paralytic Shellfish Poison (PSP) at the Department of Environmental Protection's Lawrence

Experiment Station (LES). Sampling was conducted weekly (except November) at 14 primary stations using blue mussels, Mytilus edulis, as the sentinel species commencing March 26, 1991 and ending November 19, 1991.

Due to personnel reductions at LES, South Shore samples were shucked at Sandwich by DMF prior to shipment to the lab and North Shore personnel assisted the LES staff in conducting some of the PSP bioassays.

This was the first year since 1988 that a bloom of the dinoflagellate Alexandrium tamerensis, the causative agent of PSP (Red Tide), did not precipitate a closure of shellfish areas. Only the harvesting of surf clams, ocean quahogs and carnivorous snails was prohibited during 1991 from the Gloucester-Manchester line to New Hampshire as a result of residual PSP toxin levels from 1990. In 1988, 1989, and 1990, blooms causing extensive shellfish closures from New Hampshire to the Cape Cod Canal (except Boston Harbor) occurred each year near the end of May.

The Shellfish Program was also involved in other marine biotoxin related activities over the year. The field component of an FDA funded study being conducted by the Department of Public Health operated out of Sandwich under the supervision of the chief biologist. This study in conjunction with others is seeking to monitor the temporal and spatial distribution of marine biotoxins in mollusks from inshore and offshore waters and to develop and refine testing methods and protocols.

Also, the shellfish program and other DMF personnel provided input, guidance and samples for an adjunct DPH study funded by FDA of biotoxin levels in lobster tomalley after PSP levels in excess of the 80 ug/100 g FDA action level were found in lobsters from Maine and Canada.

Project personnel regularly provided technical assistance to municipal shellfish authorities on management plans, harvest techniques and review of projects affecting shellfish habitat.

Information on aquaculture techniques and procedures for obtaining shellfish grants and propagation permits was provided to shellfish constables, grant holders, and prospective aquaculturists as well as other state and federal agencies. Project personnel were involved in an extensive review process involving DEP, CZM, various federal agencies, and The Massachusetts Aquaculture Association concerning U.S. Army Corps. of Engineers licensing of aquaculture. Eventually the Corps was able to develop a less complicated and less costly procedure called a Letter of Permission (LOP) under authority of the Clean Waters Act and the River and Harbors Act to meet their needs and regulate aquaculture in navigable waters of Massachusetts. The provisions of the LOP allow most customary aquacultural activities on areas not exceeding 10 acres. Larger areas or activities which may deviate from established LOP criteria require the full army licensing process.

> ***"This was the first year since 1988 that ... PSP (Red Tide), did not precipitate a closure of shellfish areas."***

During 1991, 24 proposed shellfish grants were surveyed and approved and 147 special shellfish propagation permits were issued allowing the possession and/or transplant of seed shellfish for aquaculture. Oyster samples from eight sites were sent to the National Marine Fisheries Service's Oxford Laboratory to be analyzed for the oyster diseases MSX and ''Dermo''. ''Dermo'' or Perkinsus marinus was found in Taunton River and Mattapoisett River oysters. Previously it had only been found in Wellfleet. MSX also remains prevalent in Wellfleet.

In addition, 14 contaminated relay permits were issued to municipalities which resulted in the relaying of 4,800 bushels of quahogs mostly from New Bedford Harbor and 7,000 bushel of oysters primarily from Mattapoisett and Wareham for natural depuration and propagation.

Other water quality related work included special training - studies involving technical assistance from the U.S. Public Health Service's FDA and Northeast Technical Services Unit (NETSU). A hydrographic study using dye in the effluent of the New Bedford Waste Treatment Plant was completed in June as part of larger New Bedford harbor and Clark Cove sanitary surveys as well as to provide training in the use of dye to determine time of travel and dilution of pollutants. FDA also provided training in the use of dyes and the calculation of flows during a sanitary survey of the Weweantic River in Wareham conducted in October.

Both North and South Shore personnel have been actively involved in EPA Bays Program related activities by providing data, reviewing project proposals and making recommendations regarding funding of projects. Shellfish staff are members of various technical committees for individual projects related to the Mass Bays Program and the Buzzards Bay Project. These projects involve water quality studies geared toward funding and abating pollution affecting shellfish areas, storm water management and allowing the establishment of conditional classification in these areas. Under these programs, shellfish personnel have been involved in projects in the Westport River, Fairhaven, Wellfleet Harbor, Wareham River, North River, Plum Island Sound and Weymouth Fore River.

Project personnel attended over 150 meetings throughout the year concerning shellfish related activities. All field personnel attended a week long course on Marina Impact Assessment given by the U.S. Public Health Service,

Northeast Technical Services Unit (NETSU) at Davisville, RI, to be trained in assessing the impact of marinas and boats on water quality. The Division is an active participant in the Interstate Shellfish Sanitation Conference (ISSC) with personnel active on key national committees dealing with shellfish sanitation and growing area classification.

Other activities included investigating 13 cases of high shellfish market samples at the request of DPH and the collection of annual shellfish landings data and shellfish budget, regulations an management information from the municipalities. Also, the South Shore Laboratory at Lakeville analyzed an additional 470 water samples from twelve state parks and beaches for the Department of Environmental Management (DEM). These samples are from drinking water supplies and bathing beaches at these facilities.

The status of the shellfish growing waters of the Commonwealth at year's end is shown in the following table:

Other Personnel:

Frank Germano, Jr. Aq. Bio. III
Susan Boehler, Bact. II
Neil Churchill, Aq. Bio II
David Whittaker, Aq. Bio. II
John Mendes, Aq. Bio I
Deborah Sawyer, Bact. I
Gregory Sawyer, Aq. Bio. I
Jerome Moles, Aq. Bio. I
Lynn Sherwood, Aq. Bio. I
Karl Von Hone, Fisheries Supervisor
Terence O'Neil, Laborer I

STATUS OF SHELLFISH GROWING AREA CLASSIFICATION IN ACRES AT YEAR'S END, 1991.

	PROHIBITED	MANAGEMENT CLOSURE	TOTAL CLOSED
NORTH SHORE	103,366	45,277	148,643
SOUTH SHORE	74,808*	316,922	391,730
TOTAL	**178,174**	**362,199**	**540,373**

	APPROVED	COND.+ APPRVD	COND.+ RESTRICTED	OPEN TO HARVEST	TOTAL ACREAGE
NORTH	334,477	3,259	1,557	339,293	487,936
SOUTH	657,315	4,337	-----	661,652	1,053,382
TOTAL	**991,792**	**7,596**	**1,557**	**1,000,945**	**1,541,318**

* Includes 40,000 acres remaining temporarily closed as a result of Halloween storm.
+ Conditional

Shellfish Purification Plant

David Chadwick, Aq. Bio. III
Project Leader

During Calendar Year 1991 53,990 racks of soft-shelled clams *Mya arenaria* were processed and released at this facility. This resulted in revenues for the Commonwealth of $161,970.00. Since we have been using the new plastic racks that we required the diggers to purchase for use at the plant, we have computed the U.S. customary dry measure of the current standard rack and found that it actually holds 0.861 bushels of soft-shelled clams. When this conversion factor is taken into account this facility truly processed 46,485 bushels of shellfish. At no time during the past calendar year were we required to relay or dispose of any shellfish for not meeting the end product criteria. This may be due in part to the addition of air pumps that have been installed in all nine (9) tanks.

During the Calendar Year (1991) The laboratory conducted the following numbers of samples. A total of 862 shellfish samples were

run utilizing the ETPC Method. 469 zero-hour samples, 140 twenty-four hour samples, 228 forty-eight hour samples, 23 seventy-two hour samples and 2 ninety-six hour samples.

In addition to the shellfish samples 1,461 membrane filtration samples were run on our tank effluent to insure quality control and proper operation of the ultra-violet units. The laboratory also initiated a comparative sampling program to determine the effectiveness of the membrane filtration method to determine coliform bacteria in our effluent waters. 26 samples were taken and analysis run by 52 MPNS and 104 membrane two-step filtration tests.

During this past fiscal year we were in the process of helping the personnel from the United States Food and Drug Administration, Northeast Technical Services Unit from North Kingstown Rhode Island conduct a process verification study of this facility. Their personnel were here for two weeks in May, July and November of 1991. A draft report is expected shortly. In addition, the facility's laboratory underwent a complete inspection by the USFDA in January 1991.

In January 1991 Ralph Stevens was promoted to the Maintenance Foreman position after the retirement of M. Fred MacBurnie. This necessitated a change in the work schedule where the plant was processing shellfish seven days a week but digging was restricted to Mondays through Fridays. A lack of staffing still prevents processing shellfish any other days.

Plant personnel attended many meetings with town officials, shellfish advisory boards, and shellfishermen. Bi-monthly Master Digger meetings were organised to improve dialogue between the Division and the Master Diggers. Numerous tours of this facility were conducted and technical assistance provided government agencies and private citizens.

Other Personnel:

Wayne Castonguay, Bact. II
Jeffrey Kennedy, Aquatic Bio. II
Diane Regan, Bact. II
David Roach, Jr. Aq. Bio. I
Laura Savina, Bact. I
Stephanie Cunningham, Aq. Bio I (P.T.)
Gregory Hancox, Aq. Bio I (P.T.)
David Yashura, Fisheries Supervisor
Ralph Stevens, Jr., Maint. Foreman
Ronald Dupuis, Laborer II
Shawn Murrow, Laborer II
Ronald O'Roarke, Laborer II
Albert Thistlewood, Laborer II
Thomas Stefanile, Laborer I
Douglas Welch, Laborer I

Coastal Lobster Investigations

Bruce Estrella,
Aq. Bio. III
Project Leader

Monitoring the health and abundance of the Massachusetts coastal American lobster resource continued by means of a cooperative sea sampling program with commercial lobstermen. To date, this effort has produced an 11-year time series of biological and catch-per-unit-effort data. These data and those generated by additional research efforts conducted by project personnel have been useful in answering a variety of resource management-related questions.

A total of 45,026 lobster were sampled from 16,366 trap hauls during 97 sea sampling trips in 1991. The catch-per-unit-effort and landings of marketable lobster declined by 4% from 1990 statistics. Fishing mortality increased to its highest level in the eleven-year time series. Catch rates of eggers fluctuated with relative abundance of the resource while the proportion of females with eggs varied less. The cull rate remained stable at about 18%. The relative proportions of lobster in the market weight categories stabilized since the 1988-1989 gauge increase years. The percentage of chickens decreased by 9.5% but 1 1/4-1 1/2 lb. and 1 1/2-3 lb. lobsters increased by 6% and 4%, respectively. Analyses of a long time series of landings, effort and sea surface temperature, from Boston and Woods Hole Harbors, revealed significant immediate and lagged effects of temperature on Massachusetts landings and catch per trap.

Ancillary research efforts were implemented as needed. Our long-term bottom water temperature monitoring program continued to generate data from seven coastal Massachusetts locations. All monitors underwent electronic upgrading by the manufacturer and were re-deployed. This time series of data was sought by a number of researchers for numerous population dynamics or behavioral analyses. In addition, the relationships between lobster 6th tail segment length and carapace length was also assessed. Results establish an enforcement potential if marketing of lobster tails is legalized. A reanalysis of all data collected during Massachusetts lobster tagging studies was undertaken to provide a comprehensive assessment of lobster growth and movement for our area. Results will be invaluable to future fishing mortality assessments.

Several statutory and regulatory changes have occurred which affected lobster management. A five-year gauge increase program designed to raise the minimum legal carapace length through implementing four 1/32" annual increments with a one-year interim ''rest'' or evaluation period was stalled through legislative action. The final two increases, which were scheduled for 1991 and 1992, were delayed because of industry concern about market impact.

An increase in lobster trap escape vent height to 1 7/8" corresponding to the current minimum size of 3 1/4" was implemented along with a requirement for an escape panel, 3 3/4" by 3 3/4". This panel must be constructed of or secured to the trap with biodegradable material to negate ''ghost pot'' fishing.

The regulated definition of a V-notched lobster, which was designed to resolve enforcement problems and minimize impact on landings resulted in significant reductions in proportions of lobster categorized as V-notched. Despite our extensive collection and analysis of V-notched lobster data which demonstrated this, V-notch lobster protection was also removed from Chapter 130 through legislative action.

The project leader continues to act as an advisor to the New England Fishery Management Council (NEFMC) on lobster biological issues and has provided numerous analyses to evaluate its management propos-

als. He is also chairman of the Atlantic States Marine Fisheries Commission lobster scientific committee, which has a goal of achieving coastwide sampling and analytical standardization in order to attempt an inter-jurisdictional assessment of the resource. Strides in cooperative assessments of fishing mortality by stock unit have been made. Accordingly, project personnel participated in NEFSC Stock Assessment Review Committee (SARC) and Stock Assessment Workshop (SAW) meetings involving a review of the scientific committee's lobster research efforts. As a result, fishing mortality rate analyses dominated the time and effort expended by this project's personnel.

We continued to provide advice to lobster dealers in the holding and shipping of lobster and assisted them in troubleshooting abnormal mortality and disease problems. A second edition was drafted of the project's 1984 publication entitled: Techniques for Live Storage and Shipping of American Lobster.

Attendance at Massachusetts Lobstermen's Association monthly delegate meetings continued so as to communicate agency research activities and management policy to the industry. The gauge increase delay, marketing study, overfishing definition, effort limitation, sea urchin by-catch, gear conflicts, pollution, biotoxins, and resource status are examples of the more important issues which we have addressed at these meetings.

Presentations of our research findings were made to other governmental agencies, formal local and international scientific meetings, the industry, and general public. Information on lobster biology, behavior, rearing, resource status, management, disease, pollution, economics, and sampling design is regularly disseminated to satisfy requests from other researchers, the press, and the public. Similarly, environmental impact statements were generated for a proposed Hyannis Harbor dredging project, and two Boston Harbor blasting and excavation projects.

Extensive time and effort was expended in assisting other DMF project personnel in data requests, statistical analyses, computer software design and development, computer troubleshooting, and field sampling. These projects included the Council Liason Project, Fisheries Information Project, Pilgrim Power Plant Project, Fisheries Resource Assessment, Shellfish, and North Shore, South Shore and Cape and Islands Sportfisheries Projects.

Scientific manuscripts were reviewed at the request of the editors of a number of scientific journals and research funding institutions including The International Council for Exploration of the Sea (1), Narragansett Bay Project (2), Journal of Shellfish Research (2), University of Maine Sea Grant (1), University of New Hampshire Sea Grant (1), and University of Rhode Island Sea Grant (1).

Project publications generated since the last annual report include:

Sindermann, C.J., Csulak, F., Sawyer, T.K., Bullis, R.A., Engel, D.W., Estrella, B.T., Noga, E.J., Pearce, J.B., Rugg, J.C., Runyon, R., Tiedermann, J.A., Young, R.R. 1989. Shell disease of crustaceans in the New York Bight. NOAA Technical Memorandum NMFS- F/NEC-74, 47 p.

Estrella, B. T. and S. X. Cadrin. 1991. Massachusetts coastal commercial lobster trap sampling program, May-November, 1990. Massachusetts Division of Marine Fisheries, 51 p.

Estrella, B. T. and S. X. Cadrin. In Press. Massachusetts coastal commercial lobster trap sampling program, May-November, 1991. Massachusetts Division of Marine Fisheries, 19 p.

Estrella, B. T. and S. X. Cadrin. In Press. Fecundity of American lobster in Massachusetts coastal waters. I.C.E.S. Marine Science Symposia Series.

Estrella, B. T. 1991. Shell Disease in American lobster *Homarus americanus*, H. Milne Edwards, 1837) from Massachusetts coastal waters with considerations for standardizing sampling. Journal of Shellfish Research, Vol. 10, No. 2, 483-488.

Estrella, B. T. In Prep. Techniques for live storage and shipping of American lobster. 2nd. edition. Massachusetts Division of Marine Fisheries.

Other Personnel

Steven Cadrin, Aquatic Biologist I

Fisheries Technology Program

H. Arnold Carr,
Aq. Bio. III
Program Leader

The Fisheries Technology Program researches conservation engineering questions and needs; acquires data and information for the Division and Regional Council on fishing effort, impact, and conflicts; and is an active communications link between the Division and industry. Our research includes: investigating net selection and escapee survival relating to groundfish; assessing the survival of discarded finfish, testing and introducing a modified ICES gauge for net measuring in research and law enforcement; and assessing a means to sharply curtail the ability of lost gillnets to continue fishing for cod and other groundfish. The program coordinator and three information officers assist the Division and the Regional Council in the orderly development of resource management initiatives. The staff monitors and advises the Division of developing problems, concerns, and conflicts, especially as they relate to sound management.

NET MESH MEASURING DEVICE

We recently produced a mesh measuring device which is accurate, easy to use, and produces consistent results between individual users. This device, the MARFISH Gauge, is particularly designed to measure webbing in nets commonly used in the otter trawl fisheries. A series of comparative tests were undertaken and summarized in a report which includes the results of those tests and the observed measurement differences between gauges.

SELECTIVITY AND SURVIVAL OF GROUNDFISH IN TRAWLS

An SK project was approved to allow us, in collaboration with the University of Rhode Island, to continue investigations on the size selectivity of trawls and the survival of codend escapees. Our efforts focused on the Atlantic cod and yellowtail flounder and considered two trawl rigging designs: square versus diamond mesh cod ends.

SELECTIVITY OF TRAWL EXTENSIONS FOR WHITING AND BEHAVIOR OF WHITING IN TRAWL GEAR

A project to investigate the selectivity and behavior of whiting in trawl gear continues. This effort has two objectives:

1. Compare the selectivity of diamond and square mesh extension pieces in trawl gear as these relate to whiting and other species caught while targeting whiting.

2. Observe the behavior of whiting and other species present in and around the trouser trawl and a commercial whiting net. The observations may provide information that will show different behavior of whiting and other species. This difference in behavior will suggest ways to modify trawl gear to be more selective.

IMPACT AND FATE OF AN INSHORE GHOST GILLNET

A study to determine if degradable float systems reduce the active fishing life of lost demersal gillnets was undertaken jointly by the NMFS Fisheries Engineering Group and this project. The study was supported by the NOAA Entanglement Program.

Our focus was on the eventual elimination of net buoyancy of a lost net. Without the buoyancy of the floats and floatline, the gillnet would lose much or all of its vertical profile, become overgrown, and blend into the bottom.

DISCARD SURVIVAL OF TWO GROUNDFISH SPECIES

This year we and the New England Aquarium teamed together

to address juvenile bycatch survivability in one subset of the finfish fishery: the North Atlantic trawl fishery. We conducted fishing operations aboard the F/V Christopher Andrew for five days between the 3rd and 9th of June 1991. Of the 573 fish examined on deck, 473 fish (264 cod and 209 dab) were selected to assess survivability in caging experiments. The cod sample amounted to 264 fish: 52 control and 212 treated. A total of 209 dab were collected: 61 control and 148 treated.

PORT SURVEY

The three Information Officers made two surveys of fishing vessels in coastal ports during each of the three years of this project's duration. These surveys were made in the summer and the winter. The data was obtained from interviews with local harbormasters and other knowledgeable local personnel.

SEA SAMPLING AND FISHING EFFORT OBSERVATIONS

Program staff undertook or participated in three surveys concerned with fishing effort. This work was initiated by the Director of Marine Fisheries or and with concert with the Massachusetts Marine Fisheries Advisory Commission. Although the surveys involved fishing activity within Commonwealth waters, each had implications on fishing and stocks that are in federal or other state waters.

ICES MEETING

The project leader attended the four day meeting of Fishing Technology and Fish Behavior Working Group (FTFB), a subdivision of the ICES Fish Capture Committee, that was held in Ancona, Italy in April 1991. He was part of a two man representative team sent there by the New England Fishery Management Council.

Project personnel participated in a number of regional workshops and expositions. A booth was manned at the International Commercial Fisheries Show in New Bedford and at the annual meetings of the Massachusetts Lobstermens Association. The project leader attended the 1991 Long Island Fishermen's Forum and discussed net selectivity, discard survival, and fish behavior to trawls.

Several HAACP (Hazards Analysis Critical Control Point) Workshops were held with project personnel attending and discussing the implementation of that program. This program emphasizes quality product handling aboard fishing vessels. We assisted in disseminating information on these workshops and successfully encouraged members of the fishing industry to attend them.

Meetings were held among program staff and our counterparts in New Hampshire and Maine. Each meeting agenda was designed for all of us to report on current projects and activities and to also focus on relevant problems.

A 15 minute video on sea scalloping was assembled. The video, which is not narrated, came from footage shot by a New Bedford Captain on Eastern rigged and Western rigged scallopers. Frequently, film or video footage of fishing activities are not available; we considered this opportunity a rare, but unique gain to garner this commercial fishing material.

Project personnel responded to questions and requests for assistance from fishermen, associated industries, other related groups and organizations, and state and federal agencies.

ASSISTANCE TO OTHER AGENCIES OR INSTITUTIONS

Project personnel assisted or collaborated with a number of local, state and federal agencies that included the ASMFC, US Coast Guard, NMFS, Mass. Office of CZM, Mass. Division of Environmental Law Enforcement, MIT, Woods Hole Oceanographic Institution, URI, Manomet Bird Observatory (Sea Sampling Program), National Fisherman and Commercial Fisheries News (the latter two are monthly publications).

Other personnel:

Charles Connor, Info. Officer II
Robert Bruce, Info. Officer II
Paul Caruso, Aq. Bio I

Fisheries Communications Program

Buell Hollister,
Info. Officer III
Program Leader

The goals of the Fisheries Communications Program are to effectively communicate fisheries conservation and technical information to the fish consuming public, the fishing industry and recreational fishermen in order to increase voluntary compliance with fisheries regulations. In addition the Program provides a means for rapid dissemination of accurate information following a natural or man-made fishery disaster, or other fast-breaking event affecting the industry.

Additionally, an important part of the Program is its participation with the Fisheries Technology Program in a conservation engineering effort.

The fishing industry was contacted through several appearances at meetings of the Gloucester Fisheries Association, the Gloucester Chamber of Commerce and meetings with the National Fisheries Institute and the New England Fisheries Development Association (NEFDA). Fish Expo booths were manned, as were similar displays at the Massachusetts Lobstermens Association annual meetings, and the New Bedford trade show. Talks were given to the Boston Harbor Associates about the fishing industry. The program participated in ''Gloucester Fisheries Set the Course'' a symposium which explored the future of the industry in the region.

The program leader was elected Secretary/treasurer of the Northeast Marine Advisory Commission (NEMAC), a long-standing conduit of fisheries related communications whose membership includes Sea Grant agents, NMFS, and state agencies from New York to Maine. Attended meetings of the Conservation Engineering Working Group.

News Releases and Other Press Contacts

News releases were mailed to general and trade media on numerous topics, including licensing, public hearings, new minimum sizes for lobster and various finfish, new fisheries regulations, a public launch ramp opening, handling of v-notched lobsters, underutilized species (Gloucester's ''new fish'' festival), gear conflict reduction, IWP operations and other subjects. Releases in CY'91, for example, were on:

.Dedicated funding initiative

.Heavy metals in Boston Harbor

.Illegal purchase of Striped bass

.Soaking scallops

.Ending recreational fishing loopholes (100 lb + 1 fish exemption)

.Mass. Offshore Groundfish Task Force

.Lobster gauge increase halted inshore

.NEMFAC's programmatic funds

.Record lobster landings in state

.Licensing regulation for striped bass dealers

Belding Award

Several years ago the Communications Project initiated the Belding Award for the ''conservation and wise use of Massachusetts' marine resources.'' It was named after Dr. David Belding whose work became part of DMF's foundation. The winner for 1991 was Lester Smith who received the award postumously.

Newsletter

The Program Leader wrote for, edited and published some 1200 copies each of DMF News. The newsletter is a conduit to several constituencies, including both sport and commercial fishermen, local shellfish officers, coastal conservation commissions and other municipal authorities, the media, state legislators and other interested parties.

Through the DMF News, DMF's policies of resource conservation and initiatives in conservation engineering are explained and the public is involved in its goal of enhancing coastal marine resources. By the end of CY 1991, the newsletter had been expanded to over 6,000 circulation and included a Regulatory Update, edited by Dan McKiernan.

''ANNUAL REVIEW OF DEVELOPMENTS IN MARINE LIVING RESOURCES AND TECHNOLOGY''

The Program Leader took over the editing and publishing of this annual document from Commander Ronald Smolowitz after he retired from NOAA. It provides an ''aerial photograph'' of work in progress in fisheries technology around the world, and has become a valuable resource for people in the field, both in the public and private sectors. He also participated in meetings of the Fisheries Technology Working group.

Fisheries Statistics and Automated Data Processing

Period Covered: September 31, 1990 -- December 31, 1991

Charles O. Anderson Jr., Aq. Bio. III
Project Leader

The Project goals are to refine and continue the collection of statistical data that the DMF has historically collected, continue to expand and improve the Information Management Infrastructure of the Division and other agencies within the Department of Fisheries, Wildlife and Environmental Law Enforcement, continue the negotiations to join in the Atlantic States Marine Fisheries Commission\NMFS North East Marine Fisheries Information System and to provide MIS services and technical assistance to DMF activities relative to Interjurisdictional Fisheries activities.

JOB 1 -- *CATCH REPORTS*

Coastal and Offshore Lobster Fishery -- 1990

Statistics Project personnel log in and edit all data contained in the catch reports. For 1990, the commercial lobster catch for Massachusetts fishermen was reported to be 16,567,377 pounds. This was a substantial increase over 1989, when 14,610,078 pounds were landed. It also set a record for Massachusetts landings. The 1990 catch was valued at $40,755,747. The value of pots, scuba gear and vessels in the commercial fishery was established to be $75,743,785. The reported recreational harvest was 416,952 pounds. For detailed statistics and reporting and compilation methods, the reader is referred to the publication entitled "1990 Massachusetts Lobster Fishery Statistics."

Edible crab landings were also collected from the 1990 lobster catch reports and totaled 923,932 pounds in 1990. Most of the landings were caught in offshore areas by offshore licensed lobstermen. (Audit of Commercial Coastal Lobster Catch Reports).

In 1991, 169 catch reports were selected for audit of their 1990 harvest records. Of these, 121 were chosen randomly and 48 were selected because they had either failed the audit in previous years or were excused from that audit by the Director of the Division. Of the 48 reaudits, 19 reported that they did not fish during 1990. The remaining 150 fishermen reported harvesting 1,839,058 pounds of lobster during 1990.

Striped Bass Fishery

During 1990, the Division issued a total of 1,497 striped bass permits; a total harvest of 189,090 pounds of striped bass (141,673 sold and 47,417 consumed) was recorded during the 1990 commercial fishing season. Although not all fishermen reports have been submitted for the 1991 season, preliminary dealer reports indicate that 235,416 pounds of bass were sold during the two month 1991 season.

1990 commercial bluefish landings were also collected from seafood dealers and were reported to be 689,578 pounds. Preliminary 1991 bluefish landings are 326,442 pounds.

Gillnet Fishery

Two hundred sixteen fishermen received a regulated permit in 1990 to fish with a gillnet. The 102 fishermen who did file a report, reported fishing a total of 4,414 half-nets (300 foot) in 635 strings. The three primary species targeted by these fishermen were cod, flounder and pollock respectively.

Sea Bass Fishery

In 1990, 108 fishermen were licensed to fish for sea bass. 56 fishermen reported harvesting

378,323 pounds of sea bass.

Barnstable ranked as the number one port, where 38 percent of the total harvest was landed, followed by Edgartown, Yarmouth and Oak Bluffs, respectively. These four towns accounted for 84 percent of the total catch.

JOB 2 -- *MONTHLY REPORTS*

Objectives: to obtain information on certain territorial water finfisheries which are managed by the Division; licensed commercial fishermen participating in these fisheries are required to file monthly reports of their fishing activities.

1. Fish Trap Fishery -- 1991

The Project collects monthly trap fishery landing statistics from licensed fish trap operators along the coast. During the 1991 fish trap season, which lasted from April through September, trap operators reported fishing a maximum of 25 traps in any given month (May). There were a total of 783 trap-lifts. Landings were 1,232,470 pounds of various species. Squid, mackerel, scup and bluefish were the most abundant species landed, respectively. The 1991 landings show a decline from 1990, when 1,653,580 pounds were landed. In particular, mackerel landings dropped 38% from 1990.

2. Bluefish Gill Net Fishery -- 1991

Twenty-six permits were issued to prospective participants in this fishery during 1991.

North Shore Otter Trawl Fishery -- 1990

Otter trawl fishermen participating in a regulated fishery in Massachusetts territorial waters from the southern Gloucester/Rockport town line northward to the Massachusetts/New Hampshire border must file a monthly report of their fishing activities in the area. A total of 97 vessels were licensed to participate in the fishery. The maximum number of vessels reporting for any one month was 84. The maximum number reporting that they actually fished in the areas during any month was 16, with a monthly average of 8.8.

There were 915 otter trawl tows (average 2.8 hours long) made in the regulated areas during 1990. A total of 523,193 pounds of finfish were harvested in the area, up significantly from 1989, when 197,245 pounds were landed. Primary species taken were whiting, yellowtail and blackback flounder, northern shrimp, hakes and cod. A complete breakdown of landings by species is presented in Table 9. Species composition is shown graphically in Figure 11.

JOB 3 -- *FISH DEALER REPORTS*

Objectives: to obtain special data, as requested, from seafood dealers licensed by the Division.

1. Annual Questionnaire

The Project, through an annual questionnaire distributed to each licensed seafood dealer at the time of license renewal, maintains a listing of all dealers and the products that they handle. In 1991, the Division issued 1,601 seafood dealer licenses of all kinds.

JOB 4 -- *DISSEMINATION*

Objectives: to disseminate commercial fishery statistics in monthly, annual and special publications of the Division and in cooperation with the National Marine Fisheries Service.

1. Dissemination

A publication entitled "1990 Massachusetts Lobster Fishery Statistics" was prepared. An informational pamphlet entitled "Massachusetts Lobster Fishery Status Report -- 1991" was prepared and was mailed to each lobster licensee with their 1992 permit.

An article, entitled "DMF Solves Problems of Data Overload" was prepared for and published in Issue #5 of Latest Release, the official publication of the Executive Office of Environmental Affairs Systems Modernization Project.

Project personnel assembled and submitted lobster and shellfish data to the National Marine Fisheries Service for their 1989 shore and boat survey and for inclusion in Fisheries of the United States 1990 and Fisheries Statistics of the United States.

Project personnel responded to many requests for fisheries related data. These requests came from other Division personnel and projects, other state agencies, federal agencies, consultants, the electronic and print media, special interest groups and the general public.

Numerous requests for historical fishing effort data were requested by and processed for commercial lobstermen, who had lost considerable gear in Hurricane Bob and a highly intense Northeast storm in October. The data was needed for qualification for Federal (Small Business Administration - FEMA) and Private (Red Cross) disaster relief loans. The Project developed a series of procedures which allowed release of data, but still guaranteed confidentiality to the fishermen.

The largest single data request for data came from a contractor who was studying the potential economic effects of the lobster gauge size increase. The Contractor was made an Agent of the Director and was provided with historical lobster catch/

effort statistics from 1975 to the present.

JOB 5 -- *AUTOMATED DATA PROCESSING*

Objectives: to continue to computerize the collection, compilation, analysis and dissemination of fisheries statistics collected by the Division and to refine those automated systems already in place.

The Project Leader continued to be the Department of Fisheries, Wildlife and Environmental Law Enforcement's (DFWELE) representative on both the Modernization Project Steering Committee, the body which sets all policy for the Modernization Project, and the Systems Integration Team, which is responsible for technical/operational management issues and project oversight.

The Project Leader continued to serve on an Information Resources Management (IRM) group with other EOEA personnel and EDS staff to generate uniform software application development standards for EOEA and its agencies. The Assistant Project Leader became a member of the EOEA Network Administrators Group, a subcommittee of the Systems Integration Team, that develops technical solutions to wide and local area network problems, and also develops standards for the data communications network.

During the past year, with the Assistance of the Department of Fisheries, Wildlife and Environmental Law Enforcement's GIS staff, Marine Data Layers began to be developed in the GIS. Initial digitized data includes: city and town boundaries out to the territorial sea of the Commonwealth; the present territorial sea (three mile limit) and the territorial boundaries before the latest revisions; DMF special or regulated fisheries areas, and finally, a map which located all licensed fish traps within the Commonwealth.

JOB 6 -- *TECHNICAL ASSISTANCE*

Objectives: to assist other Division and Department personnel and projects in the following areas: computer software and hardware evaluation, selection, procurement and development: statistical sampling methodology and procedures: and biometric evaluation of all fisheries data collected by the Division.

The Project continued to represent the Division of Marine Fisheries on the Northeast Statistics Technical Committee of the Atlantic States Marine Fisheries Commission. The Commonwealth's participation in NEMFIS (Northeast Marine Fisheries Information System), the electronic statistical data sharing system, had been delayed due to the lack of a Memorandum of Understanding between the Division and NMFS, on whose computer NEMFIS resides. The MOU concerns the confidentiality and protection of data in NEMFIS. Legislation authorizing the Director of DMF to enter into this MOU was passed in the 1990 Legislative Session. The formal MOU between NMFS and the Division was signed in late August of 1991. Under terms of the MOU, an Access Agreement must now be negotiated with the NMFS Regional Data Base Administrator at Woods Hole. It is anticipated that this agreement will be completed in 1992, allowing Project programmers to begin to build data interfaces between the Commonwealth's data bases and NEMFIS.

The design, evaluation, procurement and installation of microcomputer systems continued to be an area of Project activity. Nine microcomputers, eight printers and one network file server were procured and installed for DFWELE Agencies using Departmental funding. In addition, a surplus BANYAN BNS file server was acquired and installed in DFWELE's Division of Fisheries and Wildlife Field Headquarters in Westboro MA. All DFWELE field offices, large and small, were provided with v.32/42 9,600 baud modems and were given dial-in access to the EOEA Network. DMF field offices so equipped include Sandwich, the State Lobster Hatchery in Vineyard Haven and the Shellfish Plant on Plum Island, Newburyport.

Data entry and verification services were provided to the Division's Licensing Section. The Statistics Project continued to provide full responsibility for data entry, audit and verification for all data collected by the Division's Coastal Lobster Investigations Project. Approximately 53,000 lobster field sampling records were keypunched for the 1991 sampling year by the Statistics Project's Data Entry person. Due to the sophistication and complexity of the data edits and the care taken during data entry, this data was submitted to be processed virtually error free.

During 1990, the Massachusetts Executive Office of Administration and Finance reorganized its information technology and telecommunications acquisitions into a single functional unit. To provide parallel structure, EOEA reorganized management and procurement accordingly. MIS activities now include tele-communications. During the year, the Project Leader supervised the acquisition and installation of a small digital PBX telephone system for the Division of Environmental Law Enforcement's new field headquarters in Gloucester. Information regarding activities not covered by the Interjurisdictional Fisheries Act are provided for informational purposes only. These activities are not billed to the Federal Government for reimbursement under the terms of the Federal Aid Agreement.

Other Personnel:
Thomas Hoopes, EDP Syst. Analist III
Gerald Nash, EDP Progrmmer III
Anastasia Spires, W.P. Operator

Bureau of Recreational Fisheries

Randall Fairbanks
Assistant Director

The Division of Marine Fisheries' Sportfisheries Program seeks to promote and maintain a clean, productive marine environment and healthy, well managed fish stocks to serve as a major source of outdoor recreation and as a wholesome food source. To this end, the program is structured around three diverse objectives as follows:

1) To generate data necessary to manage coastal fish stocks in cooperation with other states, the federal government and the Fishery Management Councils.

2) To monitor coastal environments and activities as necessary to protect marine habitat, fishery resources and the public health.

3) To communicate with the public sector with a view toward instilling an appreciation for marine fishery resources, their utilization and their management.

Implementation of projects necessary to achieve these objectives is largely attributable to passage of the Wallop-Breaux Amendment to the Sportfish Restoration Act, which earmarks approximately one million dollars annually for Division use. Major programs presently in place are:

a. Technical Assistance which provides technical guidance regarding fisheries issues to other government agencies and private sector organizations.

b. Marine Recreational Fisheries Statistics which monitors the Massachusetts sportfishery.

c. Fishery Investigations which conducts applied research on recreationally important fishes including striped bass, rainbow smelt, bluefin tuna, black sea bass and several shark species.

d. Striped Bass Monitoring and Coordination which is a cooperative endeavor among several coastal states to coordinate striped bass management.

Grant monies available through the Anadromous Fish Conservation Act are being utilized to support the Commonwealth's Anadromous Fisheries Management project and an effort in cooperation with UMass Amherst to ascertain status of sturgeon populations in Massachusetts waters.

Projects recently completed include the printing of a Fishery Leaflet Series; completion of a Winter Flounder Management Plan and its adoption by the Atlantic States Marine Fisheries Commission; completion of a study estimating hook and release mortality of striped bass; and a study of the economics of marine angling which indicated an annual sportfishery value to the Commonwealth of 638 million dollars.

Anadromous Fish Dynamics and Management Program

Note: due to the retirement of Buzzy DiCarlo, this section combines both the Fishways Program and Anadromous Fish Dynamics.

Joseph "Buzzy" DiCarlo, Aq. Bio. III (retired), ***Anadromous Fishways Construction Project Leader*** **and Phillips Brady, Aq. Bio II,** ***Anadromous fish Dynamics Program Leader***

The anadromous fish dynamics and management program is responsible for the direction, design and evaluation of investigations regarding the dynamics of the approximate 17 species of diadromous fish stocks of the Commonwealth. Species such as river herring (alewife, blueback herring), rainbow smelt, white perch, American eel, and American shad, are evaluated as to stock size, local harvests, stock requirements, sex composition, spawning areas, and restoration potential. Information generated via this work is essential in the development of sound management practices for these historic species. From the time of the Pilgrims, anadromous species have played an important role in the sport and commercial fisheries of Massachusetts. They seasonally provide a ready source of forage and food for popular game fish and coastal fishermen.

Information is compiled into technical reports with assessments and findings reflected in management recommendations for the approximately 150 anadromous fish runs present between the Rhode Island to New Hampshire borders.

During the past eighteen months, information on the status of these fish stocks was collected, evaluated, and/or distributed for thirty-three coastal systems. Water quality and environmental parameters were recorded for many of the aquatic systems investigated.

Propagation:

In its ongoing efforts to re-establish, augment and enhance natal anadromous runs and in conjunction with ongoing fishway replacement or improvement projects, 128,150 pre-spawning adult alewives and blueback herring were transported via truck to 20 river systems throughout Massachusetts during the 1991 and 1992 spring stocking periods. Restoration efforts of the American shad to the Charles River also continued with the introduction of 2,518 running ripe fish from the Connecticut River runs during the same period. Assessment of these efforts is ongoing.

Construction and Improvement to Passage Facilities:

During this past project period two fish passage facilities were reconstructed. In Sandwich, MA. Mill Creek flows 2 miles from Upper and Lower Shawme Lakes, through historic downtown Sandwich and into Cape Cod Bay. The Dam at the mid-17th century Dexter's Grist Mill was overcome by a 75-foot concrete fishway which had deteriorated to the point of non-function. This structure was replaced with a new 3' wide 75' long weir-pool facility with a channel bypass to control excess water.

In Pembroke, Herring Brook originates in Oldham and Furnace Ponds, with a total surface area of 240 acres, and follows a 4.5 mile course through the town of Pembroke to the North River. This stream had been one of the most productive alewife runs in the North River System. During the past spring the fourth dam and fishway were rebuilt. The head wall was completely removed and replaced with a new 12" thick re-enforced half inch rebar 12" on center wall. A new base pad twenty feet long, five feet wide and one foot thick was poured in front of the head wall. The old ladder was replaced with a new sixteen foot long, two foot wide and four foot high wood denil fishway. Approximately one half hour after completion of this structure alewives were passing through the ladder.

Biological Assessments:

Rainbow smelt *(Osmerus mordax)*

Spring sampling of 4 river systems: Town Brook, Plymouth; Jones River, Kingston; Weweantic River, Wareham; Assonet River, Freetown for rainbow smelt was conducted. Although successful reproduction was documented in all four watersheds, observations indicated a noticeable decline in the number of adults and egg densities over the spawning grounds. Approximately 250,000 square feet of spawning area was observed, the majority of which is in the Jones River (104,000 ft.sq.). Working under present manpower limitations it was not possible to generate a quantitative total run size for these systems. Qualitatively, however, three of the four runs are believed to be seriously depressed from the levels indicated ten years ago. Similar assessments have been reported for many of the New England smelt streams in recent years. The one run that reflected an improvement was Town Brook which went from no fish to several hundred. Smelt populations are noted for their large swings in abundance (Boom or Bust years). The cause of this apparent decline in numbers is unknown for these systems at this time.

River herring *(Alosa pseudoharengus, A. aestivalis)*

The alewife, or branch herring, is the most abundant anadromous fish in Massachusetts. A close cousin is the blueback or glut herring which, although a separate species, is often confused with the alewife by the untrained observer and is usually lumped together with them for the purposes of management under the heading of river herring. Assessment of the Bournedale (Monument) River run on the scenic Cape Cod Canal continued during this reporting period. This representative population is one of the largest herring runs in the Commonwealth and the source of the majority of the spawning fish distributed via the propagation program. Electronic and biological monitoring during the past two springs determined that approximately 645,000 fish, 521,000 alewife and 124,000 bluebacks returned to reproduce within this picturesque and productive system. From these returns approximately 119,000 fish or 18.5 % were removed from the populations for propagation, local harvest or biological investigations. Information on weight, length, species composition and sex ratios was also compiled. Per diem growth indices were also generated for emigrating juvenile alewife and bluebacks for the first time in this system.

The river herring run of the Agawam River in the town of Wareham was also monitored during the spring of 1991 and 1992. The herring fishery on this system was established in 1838. Historical records indicate that catches from 500 to 3,000 barrels per year were produced during the late 19th and early 20th century. Today fish are commercially harvested on demand by the town three days a week with yearly harvests ranging from 200 to 300 bushels. Biological as well as environmental data was collected for both spatial and temporal comparisons from the catching area on this system.

American shad *(Alosa sapidissima)*

The largest member of the herring family and once abundant in the larger coastal rivers of Massachusetts, the American shad is highly regarded as a game fish and its white flesh and exotic roe supports a considerable commercial fishery along the Atlantic coast. Assessment of the Division's restoration of the ''poor mans salmon'' to the Charles River watershed is ongoing. Total number of returns to date are small, however the documentation of true natal returns at the Watertown fishway is noteworthy.

Stream Flow Analysis:

Time was allotted to the construction and evaluation of flow duration curves from numerous diadromous river systems within the Commonwealth. Files incorporated from ten to forty plus years of U.S.G.S. daily and monthly flow information. One distillation depicts the monthly grand mean flows in the units of cubic feet per second per square mile of watershed (cfsm) for thirty Massachusetts rivers. Stream flows in these basins are on average highest in April and lowest in August. However analysis clearly shows that each system has its own unique patterns and should be evaluated independently on a case by case basis. Three month seasonal groupings were constructed with March, April & May (Spring), June, July & August (Summer), September, October & November (Fall) and December, January & February (Winter) confirming that Spring is the wettest portion of the year accounting for 45.9% of the yearly discharge followed by Winter 27.1%, Fall 14.8 % and 12.2% for the Summer. Average seasonal flows ranged from o.87 cfsm during the summer to 3.28 cfsm over the spring for the 5,184 square mile combined watershed area.

Phase I environmental resource responses, which discuss the diadromous resources of ten watersheds, were prepared and forwarded to the Boston Office for review and incorporation into various river basin management plans.

These river basins were: Neponset River, Taunton River, Back River, Weir River, Mystic River, North Coastal Basin, North & South Rivers, Jones River, Cape Cod Basin, and Buzzards Bay Basin.

The following personnel worked on fishways and stocking programs:

Ronald Marcella,
Const. Maint. Forman
John Costa, Laborer II
Alfred Campbell, Laborer

Striped Bass Management, Statistics and Northern Shrimp

Paul Diodati,
Aq. Bio. III
Program Leader

Northern Shrimp

The Project Coordinator serves as Chairman of the Atlantic States Marine Fisheries Commission's (ASMFC) Northern Shrimp Technical Committee (NSTC). In this capacity, work focuses on coordinating the regional effort to study the western Gulf of Maine northern shrimp stock, to prepare an annual stock assessment, and to provide management recommendations to the ASMFC's Northern Shrimp Section. Most of the information used to conduct the stock assessment comes from an annual trawl survey designed specifically to target northern shrimp. This survey is conducted each summer aboard the National Marine Fisheries Service's (NMFS) R/V Gloria Michelle. Ancillary work to refine assessment estimates began in 1989 utilizing both manned and unmanned submersibles to explore the untowable bottom of Jeffreys Ledge for information relative to shrimp density and spatial distribution.

Substantial increases in effort in this fishery in recent years, coupled with the use of small mesh trawls, has led to concern about potential mortality and loss of yield due to bycatch and discard of juvenile finfish (Clark and Powers 1991). The NSTC addressed this problem directly in 1988 by forming the Ad Hoc Shrimp Gear Committee (SGC). The SGC consists of fishing gear experts from the New England Fisheries Management Council's Conservation and Engineering Panel and NSTC representatives. The Committee's task was to conduct field tests under commercial fishing conditions using several net designs which had showed some "finfish separating characteristics" during experimental trials pioneered by the state of Maine's Fisheries Technology Service. Although early SGC experiments proved to be inconclusive, substantial groundwork for future testing had been laid. The search for a functional shrimp net that allows high escapement of juvenile finfish continued in 1991 under the direction of the NMFS's Fisheries Engineering Group. Current work centers on a rigid panel fixed in the net that will exclude the capture of most finfish (Nordmore Grate). The NSTC serves in a support/advisory role with regard to this work.

The 1991 trawl survey for northern shrimp was successfully completed. This information provided the basis for a 1991 northern shrimp population assessment and other ancillary reports. A presentation of this work was given at public hearing to the ASMFC Northern Shrimp Section. A report updating the status of the ASMFC's Northern Shrimp Fisheries Management Plan (FMP) was prepared and submitted to the ASMFC's Science and Management Committee. Several performance reports on shrimp trawl tests and S-K Grant Proposals were reviewed and comments were drafted for presentation to the NMFS.

Field and Laboratory activity consisted of sea-sampling aboard a Maine commercial shrimp dragger to refine finfish mesh selection estimates while using large mesh panels behind the footrope of a shrimp net, and the sampling of shrimp from the Massachusetts commercial fishery. The shrimp were processed for information relative to age/sex structure of the harvest. Time was also spent conducting a manned submersible survey to determine shrimp array in relation to bottom type off the Maine coast. Numerous data requests (greater than 20) were received during the year resulting in verbal and written responses to print media, governmental agencies and the fishing industry.

Unpublished Reports

Diodati, P. J. 1991. A Review of the ASMFC FMP for Northern Shrimp. Salem, MA, 3 pp.

Northern Shrimp Technical Committee. MS 1991. Assessment Report for Gulf of Maine Northern Shrimp -- 1991. Salem, MA, 24 pp.

Ms 1991. Cruise Results. Gulf of Maine Northern Shrimp Survey. July 29 - August 9, 1991. Woods Hole, MA, 8 pp.

Striped Bass

The Project coordinator is the Commonwealth's representative on the ASMFC Striped Bass Technical Committee (SBTC) and is a member of the ASMFC Striped Bass Stock Assessment Sub-Committee (SBSAC). Primary objectives of this project are to characterize Massachusetts striped bass fisheries on an annual basis under guidelines established by the ASMFC Striped Bass FMP and to conduct ancillary striped bass research determined to be of particular importance by state-federal research program directors.

This has been achieved by collecting catch and effort data and biological information about the fishery, such as age, length, weight and sex composition. Commercial landings data was collected from seafood dealers by a telephone survey coupled with written reports, and Division staff sampled stripers seasonally at Dealer sites throughout the state for biological information. This knowledge, when combined with other statistics collected from striped bass commercial fishermen and recreational anglers (NMFS MRFSS), provided insight on parameters such as age and growth, catch-effort and fishing mortality estimates. The Project prepares detailed reports of this data and presents it to both Division and Regional Administrators each year along with management recommendations for the Massachusetts striped bass fishery.

Contributions were also made to the regional effort of studying east coast striped bass populations. A special investigation to determine striped bass mortality subsequent to their being hooked and released began during spring of 1988 and was concluded during fall of 1989. The experiment capitalized on the unique setting offered by the salt water impoundment adjacent to the Division's Cat Cove Marine Laboratory, thus incorporating elements of both laboratory and field studies. A reliable estimate of striped bass hooking mortality was developed, providing regional striped bass investigators with a crucial parameter required to run more definitive population models. The project also conducted a study to determine reporting habits of striped bass fishermen with respect to the recapture of tagged fish; in addition, in cooperation with the U.S Fish and Wildlife Service (USFWS), a Massachusetts based striped bass tagging study was designed and implemented. Hopefully this tagging study will be incorporated as an annual programmatic effort. In a cooperative spirit, the Division has offered the Cat Cove impoundment and the expertise of project staff to the NMFS and the University of Massachusetts, to conduct a special study on the retention rates of spaghetti tags that are commonly applied to striped bass by volunteer anglers.

Following methods and procedures thoroughly described in previous reports (Diodati and Hoopes 1990) the 1991 commercial striped bass fishery was monitored and biological samples were collected. The proposed fishing season, July 1 to September 30, was ended prematurely on August 28 when the harvest cap (238,000 pounds) was reached. A complete report characterizing the fishery was prepared and presented to the ASMFC SBTC. Several ancillary reports were completed for either the SBTC or SBSAC, including one which examined length based methods to estimate total mortality on Massachusetts historical striped bass data. A ''popular'' report detailing some of this information along with historical catch data was drafted as an informational pamphlet to be included with striped bass special fishery permit renewal applications.

Approximately 200 requests for information were responded to by telephone. These were primarily ''popular'' in nature, from seafood dealers, media and fishermen interested in striped bass stock conditions and striped bass/bluefish management issues. Four public and government related requests for information were acknowledged by preparing and forwarding brief narratives and tabulated data reports and an additional 22 requests were responded to by forwarding existing DMF publications/reports. Project staff attended several public hearings and meetings of the Marine Fisheries Advisory Commission (MFAC). Five technical meetings/conferences related to striped bass issues were attended during the year where reports of completed work or work in progress were given.

Unpublished Reports

Diodati. P. J. MS 1990. Estimating Mortality of Hooked and Released Striped Bass. Salem, MA. 43 pp.

MS 1991. Estimating a Tag Reporting Rate for Striped Bass Recaptures in Massachusetts Waters. Salem, MA. 5 pp.

MS 1991. Length Based Methods for Estimating Mortality on Striped Bass. Salem, MA. 8 pp.

Diodati, P. J. and T.B. Hoopes. MS 1991. Fisheries Monitoring Report for the Massachusetts 1990 Striped Bass Fisheries. Salem, MA. 22 pp.

Recreational Fisheries Technical Assistance

Technical assistance provided by DMF biologists falls into three general categories: assistance to Fisheries Management, Environmental Protection and other Public health agencies, and Private Sector organizations. The seven biologists whose reports follow provide services in all three categories in their respective regions. They are assigned to specific areas between the New Hampshire and Rhode Island borders.

H. Russell Iwanowicz, Aq. Bio. III

N. H. to Cape Ann

Sportfish technical assistance program activities during calendar year 1991 are summarized under the following headings: Technical Assistance, Communications and Ongoing Projects. My primary geographic area of responsibility is the North Shore of Massachusetts from Gloucester to the New Hampshire boundary, however, many of the activities in which I am involved concern interstate or international fisheries research and management issues.

TECHNICAL ASSISTANCE

A total of 12 coastal alteration projects were reviewed during calendar year 1991 and comments provided where necessary. Consistent with previous years, the majority of projects involved marina expansions and dredging operations.

Throughout the year technical assistance was provided to various State and Federal agencies on issues relating to recreational fishing, habitat protection and resource mapping. Assistance was routinely provided to the USF&WS, NMFS, EPA, CZM, DEP and local Conservation Commissions. Technical information relative to the fish passage facilities of the Merrimack River was provided to the NRC Oak Ridge Laboratory. Information concerning specific resources has been provided to many consulting firms and individuals in the process of preparing applications for coastal alteration projects.

Technical assistance in the form of fish identification is being provided to EPA's Waltham Laboratory on an intermittent basis. Finfish of commercial importance are identified and a document of authenticity provided to the laboratory for use in providing lab standards for electrophoretic fish ID work. EPA routinely samples fish to verify marketplace labeling.

As an appointed member of the following committees, a considerable amount of time was expended representing the Division and providing technical assistance to: ASMFC Atlantic Sturgeon S&S Committee, Merrimack River Anadromous Fisheries Restoration and Management Technical Committee, and the U.S. Atlantic Salmon Assessment Committee (NASCO). The primary function of these committees is to develop management plans to restore and/or enhance specific fisheries resources. Participating actively in these committees requires that numerous meetings be attended, new data reviewed and revisions made to older management plans reflecting current research data.

The Fishery Management Plan For The Atlantic Sturgeon *Acipenser oxyrhynchus oxyrhynchus* has been completed and accepted by ASMFC member states. Massachusetts' fisheries regulations have been amended to reflect the Plans' recommendations concerning sturgeon harvest.

Technical assistance was provided on numerous occasions to Michaelson Enterprises and the USF&WS in their efforts to produce

an educational video cassette depicting the life cycle of the Atlantic Salmon in the Northeast. This film documents ATS restoration programs in New England and associated problem areas. Copies of a Merrimack River oriented video has been received and is available to fisheries agencies and school systems for educational programs. A number of copies have been distributed to school systems in the northeast corner of the state.

COMMUNICATIONS

A major objective of the Sportfish Project is to establish and maintain open lines of communication with the private sector and to provide the general public with information related to environmental and fisheries issues. Consistent with this objective the following activities were conducted in 1991: Educational exhibits were prepared and/or manned at the Boston Hunting and Fishing Show held at the Bayside Exposition Center, the annual Outdoor Exposition held at the Worcester Centrum and the 167th Annual Topsfield Fair (10 day show). The sportfishing oriented exhibit prepared for the Topsfield Fair was again awarded a second prize ribbon for the educational merit of the exhibit.

Periodic visits were made to local tackle shops to discuss various fisheries issues and provide updated information. These visits are greatly appreciated by the shop owners and provide the Division with up to date information relative to local sportfisheries status and issues.

During calendar year 1991 sportfish oriented presentations were prepared and given to the Lynn Fish And Game Protective Association and the Essex County Sportfishing Club. A full day seminar on shad and salmon restoration was given for the students and faculty at the Essex County Agricultural and Technical Institute.

General information concerning sportfishing and marine resources is routinely provided to the public and the press in response to a constantly ringing telephone. Many letters and phone calls were received from out-of-state fishermen requesting information on sportfishing and accommodations in the North Shore area to facilitate vacation planning.

Contact with outdoor writers and most of the local sportsmens clubs was maintained throughout the year as a means of keeping open the lines of communication between the Division and sportfishermen.

ONGOING PROJECTS

Parker River Fishways: Adjustments were made to the Central Street, Byfield fishway to improve flow. However, the annual run of alewives in the Parker River has now deteriorated to such a degree that it is doubtful as to whether a self sustaining run exists. Old age has taken its toll on a number of the herring ladders on the River. Repairs to these fishways are much needed along with a total replacement of the washed out ladder at Pentucket Pond.

Contaminant Monitoring and Resource Assessment: As in past years, manpower assistance has been provided on an as needed basis to these projects.

Merrimack River Anadromous Fish Restoration Project: Tremendous progress has been made toward restoring anadromous fish runs in the Merrimack River Basin since the Division became involved in the cooperative restoration program back in 1968. As the program progresses, the amount of time and work required increases proportionately. In addition to representing the Division on the Technical Committee, I also serve as the fish passage coordinator for three fish passage facilities in the Massachusetts reach of River, the Essex Dam facility and the two Pawtucket Dam facilities.

Working with management of the Consolidated Hydro Corp. (CHI), annual schedules for fish lifting operations were established for Lawrence and Lowell. In cooperation with the Division of Fisheries and Wildlife prospective fishway workers were interviewed for the 1991 season and we were again able to have 4 workers hired as Division of Fish and Wildlife seasonal employees. The seasonal staff were then trained in the art of salmon trapping and fish counting. Anadromous fish passage counts at the Essex Dam for 1991 are as follows: Atlantic Salmon 332, American shad 16,098, River herring 379,558, Striped bass 632. Trapping operations were conducted from May 1st thru July 17 for the spring season. An additional 17 days of trapping were conducted during late summer (8/26-9/3) and again in early fall from (9/23-10/7) following rainstorms which increased river flows. Trapping for the 1991 season terminated on October 7th at which time the fishway was shut down for the remainder of the year. The fish passage/trapping facility at the Essex Dam in Lawrence was operated and staffed for a total of 95 days during 1991. Following the operational season's punch list of needed repairs and suggested improvements were provided to CHI staff.

Atlantic salmon returns in 1991 were the highest since the trapping program began in 1982. Shad counts were the third best ever and river herring numbers remain consistently high as in the past few years. It is important to remember that the counts taken at the Essex Dam reflect only those fish that successfully passed through the fish passage facility and are not to be misconstrued as an accurate picture of the total run size. Considerable spawning area for alosids exists downstream of the Essex Dam and is utilized to varying degrees by both American shad and river herring.

Throughout the spring passage season biological data was collected from the river herring and to a limited extent from the shad run. Length, weight, sex and scale samples were taken on a daily basis to provide insight as to the composition of the run. The 1991 Merrimack river herring run is composed primarily of alewives with a 6.8% complement of blueback herring. The percentage of bluebacks was up this year from last spring's (1990) meager 1.3% fraction of the river herring run. Approximately 1000 river herring scales have been collected during 1990 and 1991 (500/yr) for age-growth analysis, however, scale reading has not as yet been completed to define the age structure of these populations.

A considerable amount of time continues to be spent reviewing and commenting on study proposals by CHI and PSNH to determine downstream passage needs at their respective facilities. Operating licenses granted by FERC require that the companies work in cooperation with the various fisheries agencies to address fish passage needs at hydroelectric facilities. PSNH is currently conducting a large scale remote radio tracking study with salmon smolts to determine preferred routes of passage at 4 mainstream dams. CHI is studying downstream passage behavioral studies in Lowell for juvenile clupeids and salmon smolts. Construction of a downstream fish bypass canal at the Essex Dam facility in Lawrence was initiated this fall and should be operational for the outmigration of juvenile clupeids in 1992.

The release surplus Atlantic salmon broodstock into the mainstream of the River for sportfishing purposes has been given the approval of the Policy Committee. A number of large salmon were released into the New Hampshire reaches of the Merrimack this fall and will be available to catch in ''92''. Additional releases will probably not take place until 1993 when a surplus of fish is anticipated.

Bradford C. Chase, Aq. Bio. II

Cape Ann to Boston

Within the Boston to Gloucester District, effort in 1991 centered around two ongoing projects: the Massachusetts Bay Smelt Spawning Habitat Monitoring Program, and the Massachusetts Bluefin Tuna Fishery Investigation. Considerable time was also spent providing technical assistance to the review process of environmental permit applications, assisting sportfishing constituents, and field support for DMF lobster and contaminant monitoring projects.

SMELT PROGRAM

The primary objective of the smelt project is to produce documentation of temporal and spatial characteristics of smelt spawning habitat along Massachusetts Bay. The fourth year of sampling was conducted in 1991. Thirteen sites were sampled twice a week during March, April and May within the following river systems: Charles River, Mystic River, Essex River, Rowley River, Ipswich River, and the Parker River. Numerous stream flow measurements were made in other river systems with the newly acquired Teledyne Gurley current meter. Characterization of smelt spawning habitat was assembled through the collection of data on egg deposition, presence of adults, larvae movements, and water chemistry. No reports were completed in 1991 for this program.

TUNA INVESTIGATION

The objectives of the Massachusetts Bluefin tuna Program are to provide DMF with data on fishery characteristics and trophic interactions of bluefin tuna off the coast of Massachusetts.

Three projects were conducted under this program in 1991: a database on Massachusetts landings of bluefin tuna was established at the Cat Cove Marine Laboratory using NMFS records from 1980-1990; the fourth and last year of a food habit study on bluefin tuna feeding at five fishery locations off of Massachusetts; and coverage of all bluefin tuna tournaments in Massachusetts. A total of 140 bluefin tuna stomach were sampled for the food habit study, bringing the study total up to approximately 832.

The annual meeting of the Advisory Committee to the U.S. Delegates to ICCAT was attended in Washington, D.C., in October.

A U.S. District Court hearing on the bluefin tuna fishery was attended in Long Island, in October. The hearing was set to hear testimony on a court ordered shut-down of NMFS quota categories within the bluefin tuna fishery.

Tuna Project Reports

STAP #91-01 Progress Report on the 1989 Season Summary
STAP #91-02 Progress Report on the 1988 Season Summary
STAP #91-03 Preliminary Report on the 1990 Season Summary

TECHNICAL ASSISTANCE

Throughout the year, information exchanges and requests were received from individual fishermen, businesses, sportfishing groups, and other agencies. All bait and tackle shops in the district were visited at least once in early summer and fall, to pass out literature and exchange information. Several of these shops were visited frequently during the sportfishing season.

A majority of technical assistance effort was directed through the review of environmental permit applications. All Environmental Notification Forms and Environmental Impact Reviews posted in the Environmental Monitor (MEPA) pertaining to marine resources in this district were reviewed, and technical assistance was given when applicable. Information requests were commonly received from project proponents, consultants, or other agencies involved in this review process. The majority of these requests were concerned with shellfish and anadromous resources, and were met by verbally describing existing conditions and potential impacts.

Presentations

1. Green Harbor Tuna Club; bluefin tuna food habits, Jan. 27th
2. Fesseden School, Newton; smelt talk for 3rd graders, Apr. 30th
3. Boston Big Game Fishing Club, Randolph; bluefin tuna, May 4th
4. Harvey's Saltwater Fishing Club, Quincy; smelt, May 8th
5. Essex Bay Critical Resource Protection Conference, Rowley; Review of fishery resources of Essex Bay, May 11th
6. Northshore Frogmen's Club, Salem; DMF dive regs, Dec. 11th

Conferences

1. Essex Bay Critical Resource Protection Conference, Sponsored by Massachusetts Audubon Society, Rowley, May 11th

2. Large Marine Ecosystem Conference, University of Rhode Island, Narragansett, R.I., Aug. 13-14th

OTHER PROGRAMS

Effort was made to assist various DMF projects outside of the normal task in this district. The DMF Commercial Lobster Sampling Program required two sea days each month from May to November, and nearly 1.5 days for transcribing data for each month. The DMF Contaminant Monitoring Program required intermittent hours to collect samples of shellfish and winter flounder in Boston Harbor and Salem Sound.

Andrew Kolek, Aq. Bio. III
Boston--South Shore

Local fishermen have been reporting that the privately owned fish ladder on the Cole River had not been properly operated for the past several years. An on-site inspection and a discussion with the owner (Montaup Electric Company) revealed that the ladder was being opened during the spawning run. It appeared, however, that the ladder had been modified since its original installation to allow for easy regulation of the water flow. This modification created a submerged orifice and greatly reduced the herrings' ability to pass through the ladder. After I met with several Montaup engineers, the company agreed to reconstruct the upper portion of the ladder consistent with a design that would allow for effective passage of herring. The work was completed in October, 1991. Herring returned during the spring of 1992 and were observed ascending the ladder.

A second privately owned fish ladder in the Segregansett River was found to be inoperative. Herring were observed passing this ladder during the late 1970's but the run had not been monitored since that time. Therefore, it was not known how long the fishway had been neglected. This ladder only required flashboard replacement and maintenance. The owner (ICI America) was contacted and agreed to replace the flashboards. Regular monitoring of this run during the spring of 1992 revealed that this population had died out as no returnees were observed. Fifteen hundred alewives were stocked above the dam in an attempt to restore this run.

Time was spent stocking shad in the Charles River and checking area smelt runs.

As a member of the Technical Advisory Committee I reviewed data and participated in discussions on regulatory actions needed to improve the fish stocks of Nantucket Sound.

Assistance was given to the striped bass project. Striped bass were sampled at area markets. Length and weight of each fish was measured. Scales were taken for aging. Data was sent to the striped bass project leader. Several days were spent participating in the US Fish and Wildlife Service striped bass cooperative interstate tagging program. Eighty-two bass ranging from 25 to 40 inches were tagged.

Coastal Alterations and Habitat Protection:

Fifty four applications for coastal alterations were reviewed. Comments and recommendations were sent to the director and/or other regulatory agencies.

The Corps of Engineers proposed to dredge the entrance to Westport Harbor. An on-site meeting and inspection of the proposed dredge area was held. The project was reviewed with the Corps, Division of Waterways, CZM, Westport Harbormaster, and the Westport Shellfish Officer. An upland disposal site was selected for the clean sand spoil. Information on fish and fisheries in the area was researched and provided to the Corps. The dredging operation will temporarily displace the recreational fishery. However, impact to the fisheries

resources will be minimal.

Fish Kills:

On August 7, 1991 a fish kill involving approximately 31,000 juvenile menhaden was investigated. The kill occurred in the Weweantic River, Wareham. No other species were affected and no distressed fish were observed. Although it was thought that low night time DO was responsible for the kill, no positive cause was determined.

On August 8, 1991 a fish kill was investigated in Back River, Bourne. This kill involved juvenile menhaden, killifish, and silversides. Distressed fish were also observed on the day of the investigation. Chemical pollution from a nearby cranberry bog was suspected as the cause of the kill. Pesticide was found in fish and water samples. Data was turned over to the Attorney General's office for use in prosecuting the polluter. In an out of court settlement the bog owner agreed to modify his drainage system, change his pesticide application practices, and pay a $30,000 fine.

Information and Education:

Promoted fisheries conservation, habitat protection, and pollution reduction at sportsmen's shows, fishing club meetings, bait and tackle shops, and to various environmental organizations. This consisted of exhibits, formal presentations, and distribution of published materials.

Assistance to other Projects and Agencies:

Provided assistance to NMFS, ASMFC, US Fish and Wildlife Service, other state fish and game agencies, the Marine Fisheries Advisory Commission, towns, other Division projects, writers, researchers, students, and fishermen. Calls for information or assistance are received daily. Responses range from simply answering fisheries related questions, to gathering and providing data, to spending several days assisting with field work.

Palmer River Study:

In March of 1992 work was initiated on a study of the fisheries resources of the Palmer River. Of particular concern was the status of the alewife, shad, and white perch fisheries, which had been reported to be in serious decline. The Palmer River, located in Swansea and Rehoboth, is one of only two coastal Massachusetts steams that continues to support a shad fishery. Much of the work involves establishing finfish and water quality baseline data for future reference and management. A survey of the shad fishery conducted during the 1970's will be compared to data collected during this study.

Massachusetts Saltwater Fishing Derby:

The Massachusetts Saltwater Fishing Derby was created in 1983 to promote interest in saltwater fishing and thereby develop awareness of the need for fisheries conservation and habitat preservation. There are 24 species of game fish eligible for the derby. Anglers who catch fish that meet a certain minimum weight receive an enameled pin depicting the derby's codfish logo. At the end of the derby year trophies are awarded to anglers who landed the heaviest fish in each species category. Winners are chosen in three divisions - men, women, and junior. The program also maintains a list of all-time state game fish records.

Karen Bugley,
Aq. Bio. II

Cape Cod

The black sea bass hook and release mortality paper entitled "Effect of Catch-and-Release Angling on the Survival of Black Sea Bass" was published in the 1991 summer issue of the North American Journal of Fisheries Management. Reprints were requested by four fisheries biologists from outside agencies and universities.

Artificial reef possibilities for Massachusetts were further investigated by participating in the Fifth International Conference on Aquatic Habitat Enhancement, Artificial Habitats for Fisheries in Long Beach, CA. An abstract entitled, "Massachusetts Coastal Waters: the Status and Potential for Artificial Reefs" was submitted in March for eventual admittance into the states session. Four party boats were contacted and asked to log fishing locations and estimated catch success. Occasionally I accompanied the boats to discuss any problems and/or suggestions concerning fisheries management and to observe fishing activity. It was noted that the Yarmouth tire reef was used when the current was strong in the primary fishing spots and when other areas proved to be slow fishing. Side scan sonar and SCUBA divers were used to re-evaluate the Yarmouth tire reef for stability and productivity. Slide photographs were taken of these efforts. These slides and slides from Arne Carr's personal collection were used for the conference presentation. Contacts were made with Atlantic States Marine Fisheries Artificial Reef Committee members during the course of the conference for future guidance.

A total of 250 wetland project proposals were reviewed. Seven on-site meetings were attended to evaluate, discuss and comment on particular projects. Five comment letters were written and then signed by the director, chief of research or chief of shellfish. Shellfish surveys were conducted in the towns of Wareham, Orleans and Falmouth to assist with evaluating the project site habitat. Towards the end of 1991, the Division opted not to use specific shellfish densities as an indicator of habitat significance, which tended to

be very restrictive when evaluating and commenting on particular sites. A meeting sponsored by MCZM concerning coastal projects/alterations (docks and piers) was attended at the Barnstable Town Hall. Also, a town public hearing was attended at the Barnstable Town Hall to reinstate the Division's comments on a Cotuit Bay pier project proposal.

A total of 96 striped bass samples were collected from various Lower Cape Cod fish markets for Paul Diodati. The season was closed early on August 28th when the commercial cap was reached.

Part of one day was spent listening to Paul Diodati describe the Division's participation in the USF&WL striped bass tagging effort using charter boats. Due to a physical injury I was unable to assist on the charter boats, however, I participated as a relay person between the project leader and samplers. Assistance was also given to Dan McKiernan with squid sampling in New Bedford and the anadromous fish project with taking salinity readings on the North River.

Two fishing tournaments were attended to observe activities, obtain biological data, and field questions from participants. Cape recreational fishing club/association meetings were monitored throughout the year and special assistance was given when necessary. One day was spent manning the Division booth at the Boston Sportsman Show. Another day was spent surveying the coast for damage after Hurricane Bob hit.

During most of the spring months, I attended the graduate level fisheries population dynamics course, taught by Mike Fogarty, at the Northeast Fisheries Center, Woods Hole. A one day workshop sponsored by the Army Corps of Engineers was also attended in Chatham concerning the Aunt Lydia's Cove dredging proposal. Plus, the Division's Technical Advisory Committee meetings chaired by Dave Pierce were attended at the Sandwich office.

The goal for 1992 is to formulate artificial reef policy guidelines by using similar formats generated by other state marine fisheries programs. Also, it is hoped that some of the information gaps associated with artificial reefs, differences between the Cape Cod Bay and Nantucket Sound ecosystems, and some of the biological/behavioral questions of the individual fish species associated with bottom structure, can be addressed by proper planning and user group guidance.

Gregory Skomal, Aq. Bio. II

The Islands

A total of 1996 hours and 7593 vehicle miles were attributed to Technical Assistance activities during the calendar year 1991. The following is a summary of these activities on Martha's Vineyard and Nantucket islands. It is not arranged chronologically but rather in paragraphs of related subject matter with activity objectives and results.

Qualitative and quantitative information on recreational fisheries was collected throughout the year on Nantucket and Martha's Vineyard islands. This was done through weekly meetings and telephone conversations with tackle shops, private and charter boat captains, surf fishermen, sport fishing clubs, and local regulatory agencies. Technical information was routinely provided to these groups through the distribution of: Massachusetts Saltwater Fishing Guides, species descriptions, permit applications, regulation summaries, and tagging program information. Catch data was collected for the fifth consecutive year at the month-long Martha's Vineyard Striped Bass and Bluefish Derby. Data from successive years were key-punched and summary statistics and effort analyses were provided to participants and organizers of the event.

In an effort to monitor and study offshore recreational fisheries of marlin and tuna, catch statistics from six big game fishing tournaments were collected during 1991. Included in these were all the billfish tournaments held in Massachusetts. To improve the quality of data, a survey form was designed to obtain more complete catch/release information. Valuable indices of abundance (CPUE) were calculated for comparison with previous years. Catch data were forwarded to the SEFC Billfish Program (NMFS, Miami) for inclusion in their U.S. east coast database. In addition, technical information including proper species identification, length/weight relationships, and tag/release information was distributed to tournament participants. Time was spent on boats during two of the events tagging school bluefin tuna. A database was built late in 1991 to house catch/effort data generated by big game tournaments. Work on entering five years of tournament data was initiated.

With the imminent implementation of a shark FMP, particular emphasis was placed on the study of sharks common to Massachusetts offshore recreational fisheries. Four big game fishing tournaments targeting sharks were attended. Catch and tagging data were forwarded to the Apex Predator Investigation (NMFS, Narragansett). Three trips were made offshore to tag, photograph, and dive with sharks.

To better educate the public relative to the biology and ecology of sharks, time was taken during the tournaments and throughout the year to provide technical information to tournament organizers, students, and local and regional newspapers. On five occasions, slide presentations on the ecology, exploitation, and

management of sharks were given to students, fishermen, and the general public in Boston, Amherst, and on Martha's Vineyard.

May of 1991 brought the participation in the third leg of the NMFS oceanic survey of sharks conducted on the R/V Delaware II. From 5/12 to 5/28, the vessel fished from Beaufort, NC to Woods Hole, repeating longline stations of the 1989 survey. The cruise was designed to survey the abundance, distribution, and biology of large Atlantic sharks.

Research continued in 1991 on the ecology of the sandbar shark, *Carcharhinus plumbeus*, in Massachusetts waters. In cooperation with local fishermen, nine surf fishing trips and 15 longline sets in and around Cape Poge Bay during the months of July, August, and September produced 21 juvenile sandbars; two of the sharks were tagged for migration studies. Water temperature and salinity data were collected throughout the study for correlation with peak abundance. Nine stomach samples were examined for food habit analysis and length data provided an age structure of the sample. The two day Cape Poge Shark Tournament, sponsored by the Martha's Vineyard Surfcasters Assn., was fished by 22 anglers and provided eight samples.

Time was spent in early 1991 condensing the blue shark, *Prionace glauca*, age and growth thesis for publication. Time limitations prevented complete revision and further work is required.

Two manuscripts on shark biology were critically reviewed for journal editors in 1991.

The annual meetings of the American Elasmobranch Society were attended in 1991; I acted as a judge for the student paper award.

To reach the big game fishing community, five articles addressing the exploitation, management, and biology of big game fishes were written for the Boston Big Game Fishing Club monthly newsletter and Marlin magazine. In addition, technical assistance was provided to the club in the formulation of conservation oriented policies for their three 1991 club sponsored fishing tournaments.

Public hearings relative to fisheries management measures were attended throughout the year. Miscellaneous meetings with personnel from NMFS, DMF, WHOI, The Billfish Foundation, URI, Nantucket Anglers Club, Martha's Vineyard Striped Bass and Bluefish Derby Inc., Martha's Vineyard Rod and Gun Club, Martha's Vineyard Surfcaster's Assn., The Trustees of Reservations, and Stripers Unlimited transpired in 1991.

In cooperation with the state striped bass research program, 50 bass were tagged in October with DMF biologist Paul Diodati.

Twenty-eight coastal alteration projects were evaluated in 1991. While many of these projects did not require Division comment, nine proposals involved intense review and field sampling; recommendations were forwarded to Boston. Regular meetings with town conservation commissioners, shellfish constables, DEP, CZM, and the Army Corps of Engineers were conducted to assess the environmental impacts of various projects. On three occasions, salinity and temperature measurements of upper Lagoon Pond were taken for the town of Oak Bluffs.

Twelve SCUBA dives were made in 1991 to assist hatchery personnel in the cleaning and maintenance of intake valves. An additional five dives were made on shark related projects.

In an effort to meet state and federal objectives of shellfish testing, water quality personnel were assisted on five occasions. This included the location of sampling areas, the transportation of personnel, and the collection of water samples and temperatures in Gay Head, Chilmark, West Tisbury, Oak Bluffs, and Tisbury.

Information was furnished on several occasions to various news media including the Vineyard Gazette, the Martha's Vineyard Times, the Sunday Globe Magazine, International Wildlife Magazine, and Martha's Vineyard Magazine.

Kenneth Reback,
Aq. Bio. III

Southeastern Mass.

Technical information concerning marine and anadromous sportfish species was provided to state and federal agencies, consultants and private individuals.

Biological investigations were conducted in matters of importance to sportfish species. Striped bass were tagged aboard charter boats operating off the south coast of Massachusetts. The purpose of this operation was to mark larger bass for assessment studies and to gain more information on fall migration patterns.

A great deal of time was also spent identifying and characterizing smelt spawning runs in the North-South River systems. A total of eight tributaries were chosen for investigation. Of these three were eliminated due to inappropriate physical parameters and, of the remaining five, three were found to have active smelt runs. One of these, Second Herring Brook, had not previously been documented. Due to an extremely contracted incubation period attributed to unusually high water temperatures

and scarce egg sets, all proposed measurements of spawning area parameters were not accomplished and a follow-up study for 1992 was planned.

Assistance was provided to other projects working on or related to sportfish technical assistance such as resource assessment, fishway design and maintenance, and anadromous fish stocking.

A total of 37 wetlands alteration permits were reviewed. This included a number of on-site inspections and preparation of appropriate responses such as recommendation for condition orders.

Meetings related to sportfish technical assistance matters and the administrative duties associated with the project were attended.

Several fish kills were investigated and the appropriate action taken. The largest of these was estimated at 200,000 juvenile alewives which were stranded on a cranberry bog through a water diversion system. The owner was subsequently prosecuted for his actions.

Bureau of Research

Leigh Bridges,
Assistant Director

Much of the work of the Division's research program is more appropriately termed monitoring in the classical sense. Pilgrim Power Plant Project, research assessment and Cat Cove Laboratory personnel are all engaged heavily in monitoring efforts.

After two years of suffering the effects of a fire, which destroyed the entire second story of the lobster laboratory, renovations were completed. The rebuilding effort meant an entire new heating, light and electrical system for the facility. The generosity of the local citizenry is gratefully acknowledged. Their contributions enabled the Division to replace many small items and tools essential for laboratory operations.

Cat Cove Marine Laboratory continues monitoring levels of heavy metals and PCB's in selected harbor and coastal waters. In excess of 800 analyses were performed this year. Negotiations with South Essex Sewerage District were initiated for the probable relocation of the laboratory. A technical report on PCB concentration in fish and shellfish was completed and is available to interested parties.

The Pilgrim Power Plant study team continues to monitor marine resources in the vicinity of Rocky Point, Plymouth. The program is fully funded by the Boston Edison Company and involves several studies on lobster and fin fish. Special creel census and diver studies are under way. The bottom trawl program was revised this year. Project personnel provided technical assistance. Other power plant proposals included Taunton Municipal and Edgar Station as well as the recent fish kill at Brayton Point.

This is the fourteenth year of the Division's resource assessment program. This long term time series of fish sampling data has provided the majority of information for fisheries management in territorial waters. Additionally, federal agencies including NMFS, EPA, ACOE and FDA all use this resource information to varying degrees. The program data set is fully integrated with the NMFS survey data base. This year program personnel provided much information and assistance to the Atlantic States Marine Fisheries Commission interstate winter flounder management plan. Fish stocks generally continue in serious decline except for sea herring, mackerel, dogfish and lobster.

Division research personnel provided many hours of assistance to the Attorney General's office in environmental litigation. Most notable was the New Bedford Harbor Super Fund Case involving both state and federal agencies. Division data was utilized extensively in the litigation. A major effort is underway to recover response costs which total over $160,000.

Power Plant Investigations

Robert Lawton,
Aq. Bio. III
Project Leader

Funded by Boston Edison Company via a continuing trust account, we are studying the effects of the heated effluent discharge from Pilgrim Nuclear Power Station in Plymouth on finfish and lobster in the offsite waters of western Cape Cod Bay. Not operating in a vacuum, we must also be concerned with the impacts of plant operation via mechanical means, i.e., impingement and entrainment of biota, which are monitored by another study group. Because Pilgrim Station also releases liquid radioactive wastes into the receiving waters, we are contracted to collect samples of flora, fauna, and sediment for measurements of radioisotopes.

Our objective is to determine if the effluent has biological effects, which includes formulating model hypotheses and testing for statistical significance. The systems selected for study include the local benthic and pelagic finfish communities and the area's lobster population. We have employed the following sampling devices: bottom trawl, gill net, haul seine, lobster trap, and fish pot. Underwater diver surveys and a creel census also provide viable sampling techniques.

Our investigative program has been upgraded and modified to render an optimal sampling design that is necessarily site-specific. We employ standardized sampling methods, e.g., standard trawl tows, overnight gill-net set with a seven-panel net, quantitative seine hauls, and a weighted trap haul by set-over day. Replicate samples are collected year-round at the impact and comparable reference areas. The efficiency of the sampling gear is an important consideration to minimize bias. Our evaluations have included the use of SCUBA to directly observe gear operations.

Because of its commercial importance and high information content, the American lobster is one of our indicator species selected to assess plant impact. We monitor the catch of a commercial lobsterman who fishes a number of traps in the environs of Pilgrim Station. Concurrently, we are conducting controlled research lobster-pot sampling at prescribed locations in the Pilgrim area.

This program lends itself to assess impact on the local lobster population/fishery over the long-term. Specific objectives include identifying structural changes in the local population/fishery, quantifying catch-per-unit-effort as an index of relative abundance, and examining population characteristics (e.g., sex ratios, incidence of berried females and culls, and size frequency distributions). Changes in population properties are evaluated over time and compared spatially for surveillance versus reference areas.

A diver survey program allows us direct observation of the impact area, providing an assessment of fish occurrence, distribution, abundance, and behavior in and adjacent to the thermal plume. The general condition of resident macro-algae and invertebrates is also monitored. Using a video camera, we are filming noteworthy observations of community life in and around the discharge. We modified our survey technique in 1992 to reduce the variability between diver counts that can result from a disturbance caused by the divers' arrival at a sampling station and by movement during diving operations.

The cunner is an abundant resident of the groundfish community in the Pilgrim area and a good indicator species to assess plant impact. For the last two years we have been conducting a mark and recapture study of cunner in order to follow their movements and distribution in relation to the thermal discharge current and resultant zones

of impact off the power plant. We have tagged (Floy T-bar anchor tags) and released 738 cunner in the Pilgrim area. Through June of 1992, 54 cunner (7.3%) have been recaptured. In addition to physical tagging, we are conducting preliminary work this summer with aquarium - held specimens on the feasibility of using ultrasonic telemetry tags on selected cunner. This type of tag will give much behavioral information, in that individual fish can be tracked for day-to-day movements.

In 1992, we revised our bottom trawl program incorporating diver observations with our existing otter trawling. We now can better sample the groundfish species of the area, particularly in those locations where trawling is restricted by bottom topography, e.g., in the discharge area, or lobster gear. Besides standard trawl tows, divers swim measured transects across the bottom at prescribed stations, recording data on the species, number, and approximate size of the groundfish encountered. The divers are equipped with a T-shaped probe that is pushed ahead of them along the bottom as they swim the transects. The ''T'' of the probe has washers attached at 10 cm intervals that the divers use to gauge the size of fish encountered.

We are gill netting on a monthly schedule at a permanent sampling location near the discharge canal. This generates catch/effort data which provide an indication of potential discharge effects on pelagic fish found near the plant.

Creel data are collected at the Shorefront Recreation Area at Pilgrim Station from May-October. Creel data augment gill net data and diving observations by documenting fish occurrence and distribution in the outfall and surrounding areas of the power plant. This effort highlights the valuable recreational fishery at the plant. There is an attraction of game fish to the discharge current.

We investigated and reported on a fish kill of about 1,000 striped bass at the Brayton Point Power Plant in August of 1991. A legal suit is pending. Project personnel have completed several technical reports of our study findings off Pilgrim Station which are provided to the regulatory agencies - EPA and the Massachusetts Department of Environmental Protection - to guide them in their issuance of an NPDES permit for the plant. Articles were written for the Division's newsletter, and efforts were made to promote the dissemination of information and education on the marine environment. These included talks to clubs, organizations, school classes, and technical groups, and hands on experiences with classes that we hosted at the Shorefront Area of the plant. We have been part of Earthlab Environmental Cooperative, a public-private partnership which for the last two years has provided an annual environmental education conference for teachers. Our work has entailed being a guest speaker, helping to organize the conferences, and exhibiting at the conference on marine matters. In June 1992, Earthlab Environmental Cooperative was selected to receive a Certificate of Environmental Achievement from Renew America, a national environmental organization based in Washington, D.C.

Project personnel serve on four Administrative-Technical Advisory Committees that oversee environmental studies at four power plants (either operating or in the planning stages). We reviewed and commented on 316A and 316B documents for these plants regarding environmental impact. At the request of EPA, we reviewed the draft NPDES operating permit for the Brayton Point Power Station and provided valuable input on the language of the permit. We regularly advise the regulatory agencies on power plant matters within the Commonwealth regarding fisheries resources.

Other Personnel:

Brian Kelly, Aq. Bio. II
Vincent Malkoski, Aq. Bio. I
Mando Borghatti, Fisheries Supervisor

Resource Assessment Project

Arnold Howe,
Aq. Bio. III
Project Leader

Project sampling efforts provide the means to monitor and predict abundance of finfish and invertebrates that are of major importance to commercial and recreational fishermen. Spring and autumn bottom trawl surveys of Massachusetts' territorial waters have been undertaken since 1978 and financially supported by the Interjurisdictional Fisheries Act (PL 99-659) or its predecessor until January, 1991, when the Sport Fish Restoration Act (Wallop-Breaux Fund) began funding the project. The longterm series of coastal resource survey data has been invaluable for State fisheries management decision-making. Survey data also supplement fish stock assessment information used by Fishery Management Councils and the Atlantic States Marine Fisheries Commission in developing management plans for interjurisdictional fisheries resources. Due to our efforts and cooperation of Northeast Fisheries Science Center, data are fully integrated with their resource assessment database (at no cost to the state).

The four person staff led Division efforts to complete the 14th series of bottom trawl surveys. It was our tenth year aboard the chartered NOAA R/V GLORIA MICHELLE, just re-assigned to Sandy Hook, N.J. A summary of cruise effort and accomplishment is on the next page:

In the aftermath of Hurricane 'Bob', survey net damage was particularly extensive on the autumn cruise. A service contract permitted the timely repair of two of four nets and allowed us to proceed with at least one net in reserve. In the spring, there was a noticeable drop in overall finfish biomass (weight) including skates; however, by September, only summer flounder had strongly reappeared. Also, high autumn availability occurred for Atlantic herring, Atlantic mackerel, and 'snapper' bluefish. The 1991 year-classes of scup and black sea bass were strong and weak, respectively. Other noteworthy events include: cooperation from sea bass pot fishermen who temporarily removed their gear at our request so that a planned tow (station) could be completed; the simultaneous capture of two, 10' Atlantic stingrays; and, the haul up of a large, pre-1850 anchor. Due in part to work of Division volunteers and guests, including Commissioner John Phillips and Director Philip Coates, all sampling objectives were achieved including special efforts to gather length-weight data on American plaice and ocean pout.

Summarizing cruise hydrographic data and sampling highlights, two post-cruise 'preliminary reports' were distributed to state/federal/university cooperators that received station information or biological material. Data entry, audit analyses, and report output were completed for both cruises. Annual and Final Federal-aid project assessment reports summarizing 1989 and 1990 trends in abundance, recruitment, and landings for nine of the state's most important finfish were completed.

Our 17th annual 3-week beach seine survey of Cape Cod estuaries recorded the third lowest index of winter flounder year-class production. This was not surprising given a overexploited and depleted spawning stock biomass and warmer than normal spring 1991 water temperatures.

Project staff continued to have a major role in the development of ASMFC Interstate Management Plan for Inshore Stocks of Winter Flounder. Assessing fishing mortality and describing indirect mortality due to habitat degradation was a time intensive, cooperative process especially with Conn. DEP and R.I. DFW biologists that often involved technical debate over model input parameters, biological reference points, and text content. By year's end, the majority of assessment

presentations by our staff and cooperators before the N.E. Regional Stock Assessment Workshop were favorably received but with recommendations for more consistent methodology and conservative reference points which concurred with our long held viewpoint.

Data files were often re-visited to address resource issues. For instance, we advised against a petition by the Gloucester Inshore Fishermen's Association for more seasonal access to small-mesh fishing off Cape Ann as acquiescence would reduce the chance for groundfish stock rebuilding. Survey results showed that only dogfish, Atlantic herring, and lobster had increased in abundance since 1984. With dogfish removed from the database, catch weight decreased 24%, thus the ''pie'' had shrunk dramatically with most of the loss resulting from a halving of winter flounder, yellowtail, and other regulated groundfish biomass.

Our analysis of winter flounder length frequency data convinced state managers to advance implementation of enacted 5½'' mesh regulation by two months in order to coincide with opening of the 1990 November dragging season. To counter fishermen's concerns, oral presentations by staff detailing a 13% short-term reduction in landings but with a 40% reduction in discards were made at a January informational meeting with fishermen. Using our data, staff members prepared an updated summer flounder assessment for review and incorporation in a Stock Assessment Workshop working paper. One member also participated in Sea Scallop Plan Development Team deliberations to set an overfishing definition and evaluate management options for reducing and keeping fishing mortality below it.

Considerable staff time was devoted to written critiques including: manuscript submitted for publication to American Fisheries Society; a NMFS Gulf of Maine groundfish research proposal; DMF sea-sampling proposal; and, summary of goosefish biology and assessment knowledge with management considerations. In addition, project members prepared and delivered presentations on ocean pout age and growth at the Northeast Fisheries and Wildlife Conference and another on winter flounder growth and maturation for the 3rd Winter Flounder Biology Workshop, a conference where a project member served on the Steering Committee and chaired a session. Another member accomplished installation and setup of Sandwich office desktop personal computers and dial-in access to the EOEA computer network.

Other Personnel:

Thomas Currier, Aq. Bio. II
Steven Correia, Aq. Bio. I
David Witherell, Aq. Bio. I

	Cruise 9191	Cruise 9192
Inclusive dates	5/7-22	9/5-19
Vessel hours	174	182
Stations completed/aborted	98/3	89/8
Scientific staff hrs. at sea	614	624
Age/growth/maturity samples	1,795	862
Pathology observations	2,480	2,081
Special requested samples	843	1,697

Environmental Analysis Section

Jack P. Schwartz, Ph.D.
Laboratory Supervisor

The focus of activities for the Environmental Analysis Section continues to be the Division's Contaminant Monitoring Program. This ongoing program monitors PCBs and trace metals in fish and shellfish from all territorial waters of the Commonwealth with particular emphasis on Boston Harbor and Salem Harbor. The laboratory analyzed over eight hundred fish, lobster and/or shellfish samples for five trace metals (cadmium, chromium, copper, lead and zinc) and PCBs (polychlorinated biphenyls). Laboratory personnel collected samples and assisted the Resource Assessment Project aboard the NOAA vessel F/V Gloria Michelle. We continue to support the Shellfish Technical Assistance Program's shellfish bacteria testing facility located within the analytical section and provide mercury and PCB analysis of shellfish as needed for shellfish management. We continue to provide laboratory work areas, use of analytical equipment and material support (reagents, glassware, etc.) for aquatic biologists assigned to the Sportfish Technical Assistance Program. We produced reagent test kits for the Division of Environmental Law Enforcement. The test kits were needed by Environmental Police Officers in the field to determine if egg-bearing lobsters were illegally ''scrubbed'' and to use test results as evidence for prosecution in court.

Technical assistance and analytical data was provided on numerous occasions to other state agencies in Massachusetts and New England, federal agencies, private consultants, and public constituents. The following list includes some of the more prominent programs and agencies that received analytical/ technical assistance:

U.S. Dept. Justice/Mass. Attorney General

PCB data and analysis in lobster from New Bedford Harbor were provided to support the multi-million dollar lawsuit against several companies that polluted New Bedford Harbor with PCBs. The laboratory supervisor was chosen as a witness for the Commonwealth and Federal Government. A settlement was reached with the plaintiffs resulting in damage awards exceeding sixty million dollars. Our PCB lobster analyses were cited as a significant contribution for obtaining this settlement.

National Oceanic and Atmospheric Administration

PCB data and information on New Bedford Harbor lobster sampling were provided to support NOAAs claim for environmental damages.

U.S. Food and Drug Administration

We provided laboratory data on contaminants for the past ten years to support the establishment of the Office of Seafood within the FDA. The Office of Seafood received assistance for design and implementation of a sampling program to monitor contaminants at the Massachusetts Bay Disposal Site.

U.S. Environmental Protection Agency

The Laboratory Supervisor serves as the only state agency representative from New England states on the national workgroup responsible for developing the EPA Guidance Manual for Fish Sampling and Analysis. The Workgroup consists of representatives from eighteen states and five federal agencies. Technical assistance to develop the Comprehensive Conservation Management Plan for the Massachusetts Bays Program was provided to EPA Region 1. The Laboratory Supervisor served on the joint EPA/Army Corp. of Engineers-New England Region committee for reviewing and establishing analytical

protocols for marine sediments.

Executive Office of Environmental Affairs

Several projects involving the disposal of dredge material were reviewed at the request of the Department of Environmental Protection and/or the Office of Coastal Zone Management, including the Third Harbor Tunnel project for Boston Harbor. Assistance was provided to determine compliance with quality control/quality assurance protocols and interpretation of analytical data. The Laboratory Supervisor served on the Living Resources Committee for the EOEA Technical Advisory Group and co-authored the committee report to the Secretary. Many of the recommendations provided for the report were incorporated into the Massachusetts Bays Program.

Department of Public Health

Information on PCBs and technical assistance was provided to DPH for developing a Health Risk Assessment for New Bedford Harbor Seafood in conjunction with the New Bedford Harbor superfund site remediation project.

Significant progress was made with negotiations for the proposed acquisition of Cat Cove Marine Laboratory property and replacement of the laboratory by the South Essex Sewerage District (SESD) for a secondary waste water treatment facility. A consultation meeting with the Commissioner of Fisheries, wildlife, and Environmental Law Enforcement, Commissioner of Environmental Protection and the Director of the Division of Marine Fisheries was attended to coordinate interagency response to relocation issues for the laboratory. The Laboratory Supervisor met with the Mayor of the City of Salem to discuss laboratory relocation. Several meetings with SESD and the Department of Capital Planning and Operations (DCPO) were attended to negotiate the replacement of Cat Cove Marine Laboratory and acquisition of the land by SESD. SESD has agreed they will relocate and replace the laboratory in return for acquiring the laboratory parcel. Negotiations on the cost to SESD are continuing. A temporary move is anticipated in 1993 while the new laboratory is built, followed by a second move later to a permanent replacement facility. Some operational disruption is anticipated during the move(s) but is not expected to prevent the continuation of analytical programs.

A report on PCB concentrations in marine fish and shellfish from Boston Harbor, Salem Harbor and coastal waters of the Commonwealth was produced in 1991, and the report of the Living Resources Subcommittee was completed in 1991.

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Other Personnel:

Mary Ann Gachignard, Clerk IV
Nina Dustin, Chemist III
Carol Batdorf, Chemist I
John Gilmartin, Maint. Foreman

Lobster Hatchery

Michael Syslo,
Aq. Bio. III
Project Chief

The State Lobster Hatchery and Research Station realized the culmination of a major rebuilding effort this year after the devastating fire of February 1990. A new electrical, heating and lighting system were installed along with a 20KW backup generator which is capable of powering the Hatchery during extended electrical outages. The entire second story was rebuilt including the offices and workshop area. A local bank account was opened by the ''Friends of the Lobster Hatchery'' into which donations could be made for the rebuilding cause. Over $9200. was gratefully collected and spent on replacing the many power and hand tools lost. In April, an Open House took place and over 500 people attended which was covered extensively by the local radio station and several island and mainland newspapers. Lobster hatching and stocking began again this summer on a limited basis. Due to a lack of summer help, only about 80,000 fourth stage lobsters were cultured and released.

The Hatchery continued its ongoing assistance to the U.S. Coast Guard. The Cutters Adak, Monomoy, Pt. Jackson and Wrangel all visited the facility this year for a course and slide show on lobster biology and life cycle. Many trips were made to the Operations Training Team at Otis Air Base to instruct boarding personnel for the Coast Guard on lobster biology and fishery issues.

Hurricane Bob hit the island hard in August and caused significant damage. The Hatchery was without power for six days, but due to the new generator system, we were able to continue pumping seawater throughout with no losses of lobster. Over 1 million scallop seed were also saved for the Marthas Vineyard Shellfish Hatchery.

Assistance was lent to many researchers, organizations and universities this year. A few of them include Harbor Branch Oceanographic Institute, Bodega Bay Marine Lab, Kittasato University, Florida Institute of Technology, St. Lucie Power Plant Aquaculture Division, Marine Biological Lab, Woods Hole Oceanographic Institute, Sea Incorporated, University of Maine, Epcot Centers Living Seas Exhibit, Beals Island Shellfish Hatchery, Nantucket Shellfish Hatchery, New England Aquarium, Harvard Medical School, Caicos Conch Farm, Massachusetts Lobsterman's Association and Atlantic Vetrinary College.

Hatchery staff helped with the transfer of over 6,500 adult herring from the Gay Head run to the Upper Lagoon Pond run here on the island. We are attempting to reestablish a viable stock of returning fish to a deserted run. The Chief also assisted the Massachusetts Fish and Wildlife Department in conducting an aquatic survey of Upper Lagoon Pond to catalog fish and plant life.

Squid sampling at the local fish dock was conducted this spring to monitor size composition of the catch by the local fleet. Results were forwarded to the Boston staff for analysis. Water sampling was also conducted by Hatchery staff to assist the Shellfish Program to insure clean beds or to initiate closures, if needed.

A research proposal was submitted to DMF headquarters in Boston to investigate the potential of a polyculture system of raising lobsters. Developed by the University of Maine, this system involves a less labor intensive method of culturing algae, brine shrimp and lobsters together in large vats.

Assistance was lent to 13 wholesale lobster dealers who were experiencing problems with their holding systems. Several trips were made off-island for a site inspection of their systems.

The Chief was authorized to respond to marine mammal strandings. Assistance was given to the local Environmental Police Officer in four whale strandings, and one dolphin rescue. The dolphin was kept alive at the Hatchery until it was picked up by Mystic Aquarium.

Mr. Syslo participated as an instructor in two schools this year. The Southeastern Massachusetts University aquaculture class was given a talk on lobster culture techniques and aquaculture potential and problems. The Boston University Marine Program was given a lecture on lobster biology.

Other Personnel:

Kevin Johnson, Fish Culturist